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FOOD MANUFACTURE

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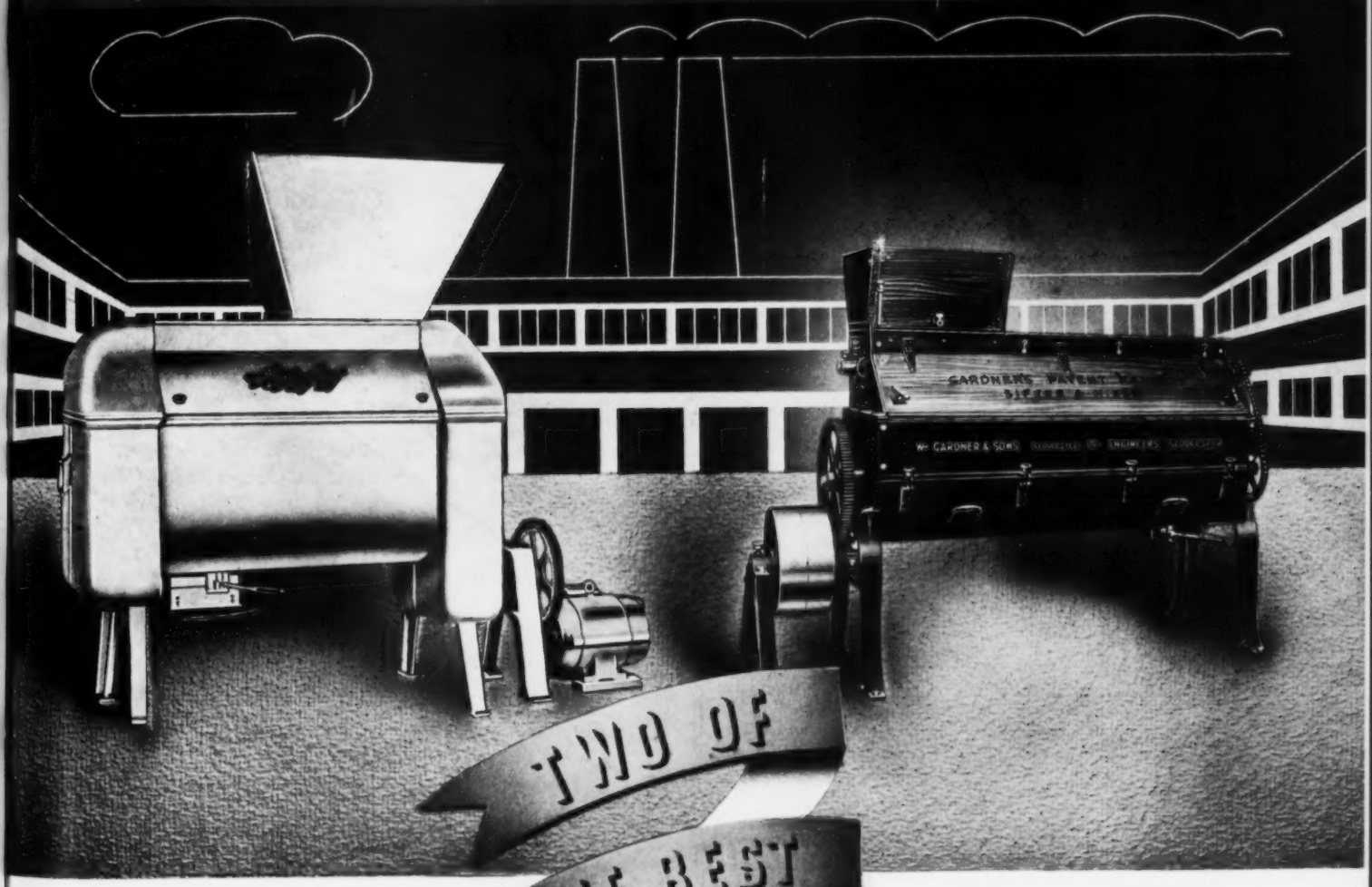

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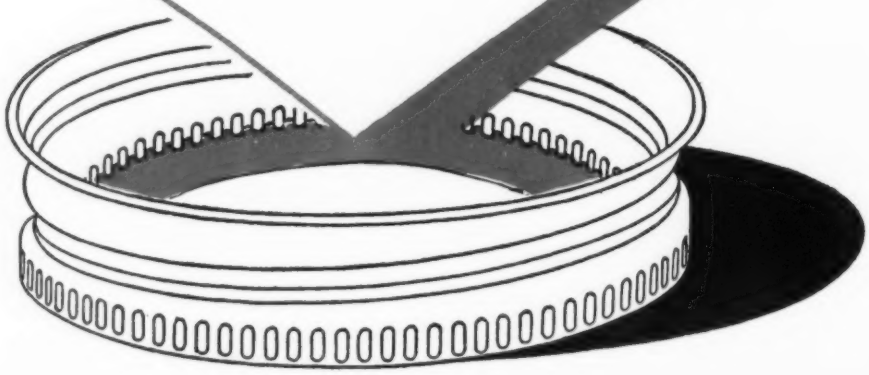

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A JOURNAL DEVOTED TO THE PRODUCTION AND MANUFACTURE OF ALL EDIBLE COMMODITIES INVOLVING A PROCESS OF MANUFACTURE.

FOOD MANUFACTURE

Incorporating Canning, Packing and Preserving.

VOLUME . . . XIV

NUMBER . . . 8

AUGUST . 1939

Sugar Confectionery Number

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

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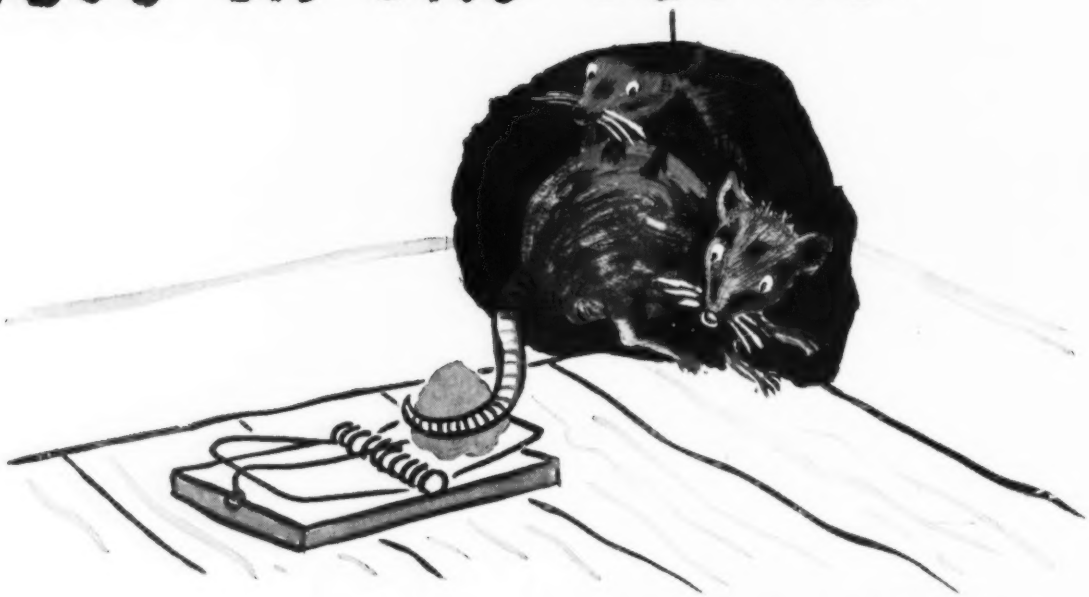

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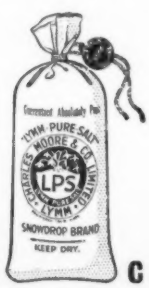

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Facing first page of Editorial

FOOD MANUFACTURE

Vol. XIV, No. 8 August, 1939

Co-operation

OUR SUBSCRIBERS will now have received four copies of our weekly issue, and it is our purpose that this combination of a weekly publication together with a monthly periodical containing authoritative articles and features which it would not be possible to give each week, should assure to all connected with the food industry a reliable, comprehensive and adequate news service.

The food industry covers a very wide field which is extending every day, and it is probable that at no period in history have questions of food storage and production been so prominent a subject of consideration and public controversy. In these circumstances it is expedient for the industry to organise itself to meet every possible contingency, and it has been our endeavour to place at the disposal of the industry as a whole an effective channel for the quick and wide distribution of vital news, at the same time maintaining ample scope for the discussion of scientific and productive advance.

In our section " News from the Industry ", mention is made of the regular features which will appear in *Food Manufacture Weekly*, which will be in the hands of readers on August 11.

Sugar Consumption

The Technical Commission of the Health Committee of the League of Nations has issued a report on the physiological bases of nutrition. In it the increasing habit in certain countries of consuming large quantities of sugar was " regarded with concern ". It is suggested that the indiscriminate use of such a source of energy without other nutritive value tends to lessen the amount of " protective " foods in the diet. There is no doubt about the magnitude of the change in sugar consumption in many countries of Western civilisation. Until the eighteenth century sugar was a very costly article in Europe—a luxury, in fact—and in the year 1700 only 10,000 tons were consumed in Great Britain. Until then, of course, the national beverage had been beer, the carbohydrate source of which was grain; but with the advent of tea and coffee the sugar consumption increased enormously. In 1800 the consumption had risen to 150,000 tons, and in 1885 had reached the total of 1,100,000 tons. Professor Ichok, of Paris, recently published some statistics, compiled from official sources, of the consumption of sugar in France. According to these, it has increased nearly tenfold in a century. A hundred years ago the average was 2 to 3 kg. per person per annum; to-day it is 22 to 23 kg. Translated into English weights, it means that in 1830-40 the consumption was $1\frac{1}{2}$ to $2\frac{1}{2}$ ozs. per head per week, whereas to-day it has increased to almost 1 lb. per person per week. Far from considering this amount excessive, Ichok would like to see the amount increased.

The Nutritive Values of Broccoli

Most people know and like cauliflower and broccoli as vegetables, but, in spite of the esteem with which these plants are held by the cook, there seems to be little information that is generally available concerning their characteristics, especially from the dietetic point of view. In a recent number of the *Illustrated London News*, Mr. W. L. Pycraft, who conducts the popular science page of that journal, gave an entertaining account of the outstanding botanical difference between the cauliflower and the broccoli. However, regarding some aspects of the broccoli, Mr. Pycraft admitted that he had no information, and did not know whence he could get any. It is evident that the work of the Seale-Hayne College in Devonshire is not yet as widely known as it should be. Some of the staff of this College have been investigating broccoli for several years, on account of its importance as a Cornish crop, and the Seale-Hayne College is in fact the British repository for all information about broccoli.

Some results on the chemical composition of the plant have recently been published: in No. 1 (1938) of the *Seale-Hayne Annual*, in a form intended for farmers, and in more technical language in the *Journal of Pomology and Horticultural Science* (Vol. 17, Part 2, June, 1939, pp. 85-98).

The authors of the latter communication are Ernest Vanstone and Charles E. H. Knapman, and from it we take the following facts.

Broccoli "curd" (the part with which the cook is principally concerned) compares favourably (on a dry-matter basis) with dried milk. The "curd" contains more protein and fibre than dried milk, but less fat; it is much richer in mineral matter than dried milk. The authors remark: "The method of serving this vegetable with butter compensates for its lack of fat, and thus makes it practically a perfectly balanced food. It is also worthy of note that the mineral matter of broccoli is particularly rich in phosphoric acid . . . and the curd must contain organic phosphorus analogous to the casein of milk."

Nor is this all: the leaves of this remarkable vegetable have on an air-dry basis almost the same composition as extracted palm-kernel cake, one of the farmer's most esteemed concentrated stock-feeds. Perhaps some day someone will analyse the cauliflower with equal skill and assiduity, and throw fresh lustre upon *chou-fleur au gratin*.

Plant Genetics

Professor Gates, in his Chadwick lecture delivered recently in the Chelsea Physic Garden, produced a masterly dissertation on Plant Genetics and Human Welfare. Agriculture began with the domestication of plants, and very early on a selection began to improve the type. While at first this selection was unconscious, there is evidence that even in the early prehistoric civilisations great progress had been made in the improvement of various food plants. Chief of these were wheat, maize and rice. Wheat cultivation began so long ago that the development of selection is lost in antiquity, but possibly bread wheats were never truly wild species. It may well be that they originated from chance hybrids of more primitive forms. Maize looks entirely a product of man, for nothing like it has ever been found in a wild state. Rice, however, the cultivation of which arose in China, required little alteration by man, and various related wild species are found both in Asia and Africa. Since the development of genetics during the present century the production of new types of cultivated plants has gone on apace, not only in the widely cultivated species such as cereals, cotton, tobacco, sugar, etc., but in many wild plants whose cultivation man is just beginning. The researches on the structure and division of chromosomes and their relation to hereditary processes have provided a weapon for understanding how new plants have been formed in the past and hence how they can be experimentally produced or improved in the future. A good example is the selection and crossing of wheat. In all the wheats the chromosomes run in multiples of a fundamental number. The diploid species (*Triticum*) have 14 chromosomes, the tetraploid species 28 and the hexaploid species 42. The diploid is the most primitive, and from it the species with the higher numbers have been derived through later evolution. Very interesting work has been done in Russia on the crossing of wheat and rye, and one of the crosses produced a better grain than the wheat parent. Others gave bigger yields and inherited the hardy qualities of the rye. More recently crosses between wheat and couch grass have given a wheat-yielding plant which inherits from the couch grass a perennial growth. In addition, these are frost-resistant, drought-resistant, and some are immune to rust and smut. These modern intergeneric hybrids and their selection to produce useful economic types have been made possible by the application of genetical methods combined with the microscopic study of the chromosomes. The further employment of these principles will greatly extend the types of economic plants used by man.

Lead Poisoning in Ducks

In the bad old days out West, to say that a man had died of lead poisoning was a polite way of saying that he had stopped a bullet—or, in plain English, had met his death by shooting. We believe that the expression survives yet in American gangster circles. Therefore, to read that wild ducks have died of lead poisoning can hardly do anything but raise a feeble smile, especially when one learns that the birds met their death from shot-gun pellets. But, once again, fact is stranger than fiction, and some cases of poisoning of ducks by pellets of shot investigated by the Ontario Research Foundation go to show that one should be careful in drawing conclusions without *all* the facts. The birds in question had not been hit; they had swallowed pellets picked up while feeding in shallow bays of lakes which had been extensively shot over. The birds exhibited symptoms analogous to those seen in mammals affected with lead poisoning—becoming partially paralysed and being unable to fly. The condition in birds has been previously observed in the United States, but until 1938 it had not been reported in Ontario. One wonders how the milder forms of the condition affect the edibility of the ducks by man!

English Diet

Much has been written at one time or other about the Englishman's food, much of it, we fear, being very critical. The most recent contribution to this interesting subject is a book by Professor Drummond and Anne Wilbraham on *Five Centuries of English Diet*. Professor Drummond is an eminent biochemist whose views on nutrition are well known and always demand attention. This work is full of interesting details; almost everything pertaining to diet, however remotely, seems to be dealt with: poetry, political pamphlets, medical books, diaries, novels, herbals, farming and gardening books have all been called on in this search for the details of the English diet. It is not the sort of book that will so grip the reader that he will burn the midnight oil in an attempt to go from cover to cover at one go. Like the babies' food, it should be taken little and often. It might be an excellent bedside book for those who suffer from insomnia caused by indigestion. It does not follow any chronological sequence, and digressions are frequent, and the authors jump from period to period and subject to subject with delightful abandon. The book shows us how much we owe to religious and political refugees, especially from Holland, in the introduction of new foods. As a finale, two chapters called "The War" and "A New Era" are calculated to stimulate those who believe that nutrition is the foundation of national health to exert even greater efforts to obtain a more consistent and progressive Government food policy both in times of peace and war.

Animal Fats and Cancer

Some years ago it was discovered that substances which were carcinogenic to the skin were formed when living cells, such as yeast cells, or human skin were subjected to temperatures of 700° to 900° C. in an atmosphere of hydrogen. The slow destruction of the cells was accompanied by the formation of tarry matter. When cholesterol, which is a constituent of all living tissues, is treated in the same way, the same thing happens. If this tarry matter is applied to the skin of mice, tumours develop at the site of application and a local carcinogenic effect is produced. These observations of E. L. Kennaway, ten years ago, have been followed by further discoveries by Widmark, of the University of Lund, who has treated the skin of mice with alcohol or petroleum extracts of roasted coffee, browned butter and horse muscle heated to 275° C. In a recent issue of *Nature* he has described some astonishing results. When the skin was painted with the extracts, no effects were observed in the skin, but of 23 female mice which survived a period of application, 9 developed carcinoma of the mamma, but no such tumours appeared in the males. These tumours, unlike Kennaway's, were not local. The explanation of these phenomena is not obvious. It is known that mammary tumours can be produced in mice by painting the skin with solutions of œstrogenic substances, although the skin remains intact, but in such experiments the males develop cancer as well as the females. It appears as if Widmark has discovered a new group of substances which are specifically carcinogenic for the mamma. Interesting as this may be from the medical standpoint, it has an equally interesting aspect from the food preparation point of view. Do the processes used in preparing food, such as frying, roasting and grilling, produce carcinogenic substances? It is certainly a possibility which ought to be fully investigated. It must be ascertained whether these processes of cooking produce substances which, when tested by the usual method of applying them to the skin, produce skin cancer or, as Widmark claims, mammary cancer. There is also the possibility of their forming, when ingested, gastric cancer. It is such a horrible thought to banish our beloved mixed grills and the roast beef of Old England from our diet that we most sincerely hope that the answers will be in the negative.

Vitamin A Deficiency

An excellent review in relation to disease and lack of vitamin A has been written in German by Lindquist (*Acta med. scand.*, 1938, *Suppl.* 97), and is mentioned in an article in the *British Medical Journal* for June 3.

Lindquist has reported his own experiments to determine the most satisfactory method of measuring the contents of carotene and vitamin A in the blood serum and a method of determining the "minimum perceptible light", which he found to rise with age and to be the same for the two sexes. He concluded that when serum contained less than 70 international units per 100 c.c. the condition was pathological. He also investigated the minimum distinguishable differences in diminishing light, and found these to bear an inverse correlation with age and vitamin A content of serum up to an upper limit of 100 international units of vitamin A per 100 c.c. of serum. He finally determined the range of vitamin values of blood serum in normal people, and concluded that less than 70 international units per 100 c.c. of blood

serum indicated a serious shortage, that 70-100 was also low, that 100-200 was apparently sufficient for many people, and that 200-400 was the amount that might be considered really satisfactory. The second part of Lindquist's review is a very comprehensive study of his own work and of other investigators on the apparent lack of vitamin A in various pathological conditions and its correlation with the low vitamin A content found in the blood serum. Results have been examined by statistical methods to determine their significance. The whole trend of clinical work with vitamin A indicates more and more that much ill-health of a serious nature may be due to a shortage of this factor and that improvement may be brought about by making good the deficiency.

New Method for Conserving Milk

A very simple method for conserving milk without drastic heating treatment has been described by J. G. Davis in a recent issue of *Nature*.

He has found it possible to conserve milk for about a fortnight by the simple process of adjusting the *p*H to 5·2 and holding at a temperature of 36° and 38° F.

Milk requires about 4 ml. normal hydrochloric acid per 100 ml. to reduce the *p*H to 5·2. In practice it is sufficiently accurate to titrate a portion of the milk with N hydrochloric acid until casein precipitation is observed, and then add 95 per cent. of this quantity *pro rata* to the bulk.

The only effect on the milk is a slight dilution and the production of a very slight salty taste, not detectable by casual tasting.

The method would appear to offer possibilities for industrial purposes, the chief advantages being that no expensive plant is required and that the milk retains in full the original fresh milk flavour, and, although enzymic changes are undoubtedly proceeding under these conditions, the rate is so small that they cannot be detected by taste.

There are certain obvious difficulties in the application of this process, including the incidental dilution of the milk and the possible effect of the *p*H on the growth of pathogenic organisms, but its very simplicity will doubtless induce interested workers further to examine it.

Hygiene in Industry

Hygiene in industry in its narrowest conception means "observing the law as laid down in the Factory Acts, keeping to the letter of the law, in fact a little more; so little more that in the majority of small factories there is not even sanitary paper supplied". At its broadest, the provisions within a factory for safeguarding and maintaining the health of the worker constitute a very complex department involving the employment of a doctor, nurses and welfare staff. But such provisions affect only a small percentage of the total personnel in industry.

This was the theme of a paper, entitled "The Need of a Broader Conception of Hygiene in Industry," read on July 6 at the Health Congress of the Royal Sanitary Institute at Scarborough by Dr. T. O. Garland, M.A., M.D., D.P.H. The speaker went on to say that the factory organisation is not enough and hygiene must extend beyond it. He cited the army as a good example of attention to mass hygiene, and said that army and navy hygiene has always been ahead of industrial hygiene. Instead of lagging behind the army, industry should lead them in these matters, for the reason, if not any other, that industrial organisation is more complex.

Recent reports on the standard of living were quoted. We have not suffered of late from a lack of such depressing documents. In Bristol, for instance, out of one hundred thousand working-class families, eleven thousand were found to be poverty-stricken. In these families there were sixteen thousand children. Dr. Garland disputed the contention that the health of children and of the population generally was the concern of the public health services. These services do not supply material needs and in some cases merely repair damage which occurs from the lack of these needs.

There exists ample knowledge of the requirements and, the speaker asked, Why is this knowledge not more fully used? The answer as he saw it was that the individual employer will voluntarily undertake only certain measures for the benefit of his employees. History shows that compulsion is necessary for reforms except in the small majority of cases. Quoting Sir John Simon's review, published in 1890, *English Sanitary Institutions*, Dr. Garland regretted that he (Sir John) said that "he could not pretend to discuss the difficult social questions of wages and poverty". If a man of his stature and wisdom and experience could not discuss them, who on earth could? By our votes and agitation we must seek to remedy the organisation that withholds health from so many industrial workers and their children, we must concern ourselves with these social political matters affecting so closely industrial health.

And that's our civilisation up to date!

CARAMEL TOFFEE MANUFACTURE

The wise choice of sugars and attention to consistency, texture and flavour are among some of the prime considerations in Caramel Toffee making, which is here discussed by "CORTES" — the pseudonym of a well-known confectionery expert.

IN addition to being one of the most important products of the confectioner—being a serious rival of chocolate—caramel toffee is one of the most interesting. So many sugar boilers are, apparently, incapable of moving outside their personal collection of tried recipes that I feel any effort to develop a better and wider understanding of the fundamental principles of any manufacturing process is really worth while. It is with such an objective that I wish to discuss caramel toffees here.

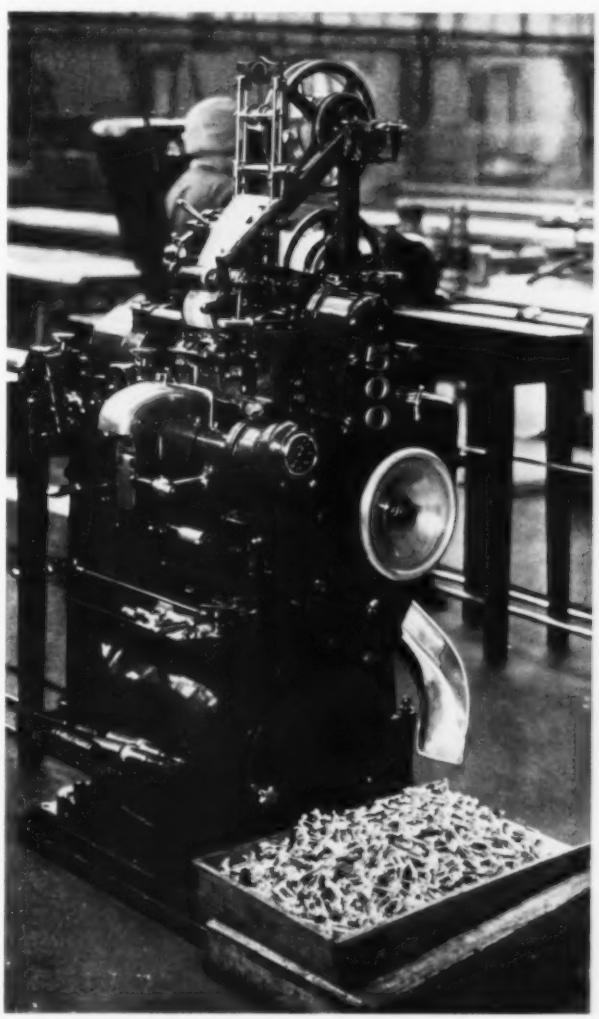
While I should be among the first to agree that appearance, style of packing, colour scheme, design of wrappings—even name—in short, the general superficial "get up" determines initial sales, I would also contend that there are other factors that need consideration to ensure "repeat business" and genuine popularity. "Eye appeal" may launch a new line, but it requires an appealing texture, consistency and flavour to keep it afloat on the rough sea of competition. Whilst there is scope for the art of the studio, there is equal—if not greater—responsibility resting on the craftsmanship of the caramel maker.

Synthetic Flavourings

When one considers the materials from which an ordinary boiled sweet is manufactured, sugar and glucose or, possibly, sugar alone, the necessity of enlisting the aid of synthetic flavours is immediately apparent. Something has to be added if a mere sickly sweet flavour is to be avoided. In making caramel toffees the situation is very different. Enormous quantities of synthetic flavourings are, however, purchased by toffee manufacturers. Sometimes these are used to "mask" objectionable flavours—an unfortunate use; sometimes to give character to an otherwise nondescript product, but more often than not—and this I consider to be the only justifiable use—to enrich the true, basic and characteristic flavour of a well-blended recipe, so creating a distinctive line.

Choice of Sugars

A certain contribution to flavour can be derived from a careful and wise choice of sugars. One is not bound to use a white granulated sugar of high polarisation; in fact, some of the most attractive caramels are produced from a blend including low-grade sugars, and these popular combinations are regarded as closely guarded secrets by the fortunate manufacturers concerned. Flavour is developed, too, through the cooking of the milk products. The analogy between the cooking of a domestic "milk pudding" and the manufacturing process



A toffee moulding, cutting and wrapping machine in use at the Hunnington factory of Harry Vincent, Ltd.

(Courtesy: Harry Vincent, Ltd. Machine by Rose Brothers [Gainsborough], Ltd.)

to which caramel toffee batches are subjected, needs only to be mentioned in passing. Even the fat ingredient plays its part in the composite, but characteristic, final flavour. So it will be seen, quite apart from working out a correctly balanced recipe—balanced from a chemical point of view—it is necessary to select one's materials so as to create the desired flavour effect.

Consistency Distinct from Texture

Consistency and texture, though similar in some respects, are, actually, distinctive characteristics when used to describe features of an edible product. It is important that both consistency and texture should be studied when considering recipe, process and ultimate product. The original toffees were simply high sugar boilings into which batches were incorporated, a quantity of butter or some other fat ingredient. In some cases the amount of fat was pathetically small but, to achieve its purpose, it had to be sufficient to turn the batch opaque and suggest a butter content to the consumer.

The "body" or hardness of such lines—the feature to which I wish to apply the term "consistency"—was dependent not upon the percentage of fat used but on the percentage of moisture retained in the final product. Of necessity, such butter toffees were boiled to 310° F. (or thereabouts) and had a moisture content of from 1·5 to 3·5 per cent., and were hard, brittle and glass-like. On the other hand, caramels and caramel toffees depend upon casein for their consistency, for their ability to "stand up" and retain their shapes.

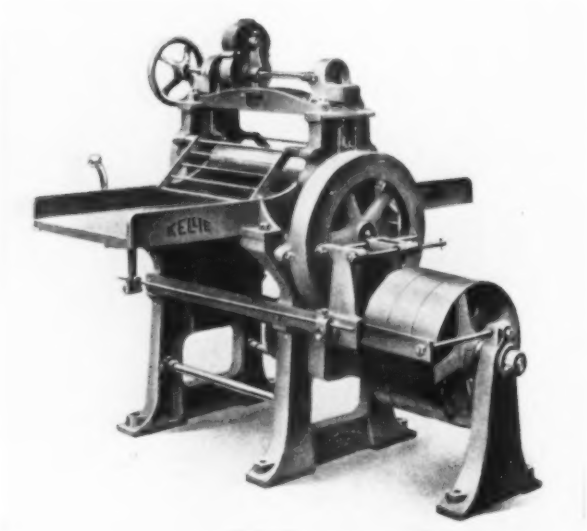
Boiling Temperature not Important

Within certain limits, the boiling temperature is unimportant, the product will keep its shape and form—provided good materials have been used in a correctly balanced recipe—whether the batch has been taken to a "hard ball", a "first crack" or a "firm crack". That is to say, any final temperature between 245° and 290° F. will be satisfactory if all other factors are arranged correctly. The casein provides the actual body, whilst the fat content, at temperatures below the melting point of the fat (or fat mixture), assists. While on the subject, there is one unsatisfactory feature—the relative instability of low-boiled batches. Obviously, products containing both fats and water are difficult to maintain in good condition.

Again, goods dependent upon their fat content—even if not wholly dependent—for their consistency, are liable to suffer when subjected to temperature changes. Finally, it may be taken as an axiom that the lower the final boiling temperature, the greater the tendency for the caramel toffee to "grain" or "sweat", according to the balance of the recipe.

Texture is a feature which, in confectionery products, I believe to be most aptly described as the apparent texture or the texture as perceived by the palate when the product is consumed. A caramel toffee should have a silky smooth texture, without trace of roughness, free from lumps and without toughness. It should be chewy—not short or stringy; the fat should be thoroughly blended with the other ingredients—it should not chew out during eating yet there should be sufficient present to prevent the caramel from sticking to the teeth.

Let us just examine one standard recipe.



Reversing Caramel Brake with Micrometer Thicknessing Gear.

(Courtesy: Robert Kellie and Son, Ltd.)

Full Cream Caramel Toffee

Brown sugar	34	per cent.
Glucose	34	,, ,,
Full cream condensed milk ..	20	,, ,,
Hard fat	12	,, ,,

Here, the balance between sucrose and dextrose is made up by the sugar content (approx. 40 per cent.) of the condensed milk supporting the brown sugar—due allowance having been made for the effect of the inversion of a portion. In constructing recipes—on paper—the amount of sucrose added, via the condensed milk, is a point to watch. Similarly, the strength of the sugar or sugars employed and the inverting effect of the other ingredients, all require taking into consideration. Incidentally, all calculations may be disturbed by any change in the rate, or speed, of boiling, or in the speed of rotation (and type) of the beaters.

The amount of milk suggested, in the recipe under review, is certainly a little on the low side. The flavour derived therefrom is, therefore, not very pronounced, but this shortcoming is offset by the exclusive use of brown sugar. The casein content of full cream condensed milk is less than that of separated condensed milk, though the fat content is higher and the flavour stronger and better. If it were necessary to adapt this recipe so as to permit it being boiled to a lower temperature than is customary, the substitution of separated milk for full cream plus an additional amount of fat

(say, 5 lb. per 100 lb.) would constitute the only alterations.

I consider that the amount of fat called for by the above recipe is only barely sufficient, but, apart from cost considerations, too much fat coats the palate and spoils the flavour. Flavour and consistency may be said to have been adequately covered. Texture is taken care of by the glucose content, the fat and, probably most important, by correct processing.

Dissolving the Sugar

There was a time, not long ago, when it was considered essential that the grains of sugar should be dissolved in water. Nowadays, the water content of the condensed milk is made to serve this purpose and no preliminary solution is prepared. If all the ingredients are well beaten together in the boiling pan, before steam is applied, the sugar can be completely dissolved. A small amount of heat may be required to assist this, but if it can be avoided, so much the better. There will be less inversion, less loss of colour and a more creamy caramel will result. This beating should occupy some fifteen to thirty minutes.

In my opinion it is wasteful to utilise a boiling pan as a whisk or beater. I prefer to use an emulsifier for this process, but where a special machine is not available an ordinary continuous worm fondant cream beater is quite satisfactory, providing the ingredients are previously mixed together. This "creaming" absolutely ensures smoothness (all other factors being correct) even when using the cheapest of recipes.

There are other methods of compounding similar ingredients to produce a caramel toffee. Here is one suggestion:

Everton Caramel Toffee

White sugar	20 per cent.
Brown sugar	10 ,, ,,
Glucose	34 ,, ,,
Full cream condensed milk	20 ,, ,,
Hard fat	12 ,, ,,
Dairy butter	4 ,, ,,

It will be noted, at once, that the balance between sucrose and dextrose is different from that of the first recipe. The reason is that a different process is suggested too.

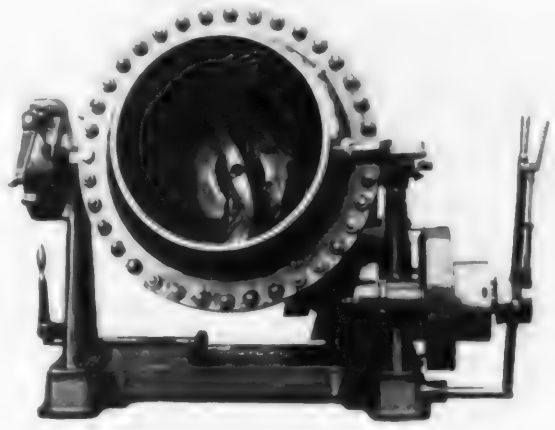
The sugars and the glucose are boiled together—in this case with sufficient water to ensure solution—to a temperature of 300° F. A high-pressure pan, not necessarily with stirring device, is required for this part of the process. When this has been done, the boiled batch is transferred to a caramel vertical mixing pan and the other ingredients added. When homogeneity is attained, the batch should be tested for consistency. It may be necessary to cook it a little, but if this is found to be the case, later batches should be made with the sugar/glucose boiling taken correspondingly higher. The ideal state, and one which may require a slight adjustment to the quantities of milk and fats, as well as alteration to the boiling height, is reached when the addition of the cold, mixed ingredients brings back the whole batch to the state of a "first crack".

Incidentally, under certain conditions it is rather difficult to incorporate thoroughly the fat with the other ingredients—particularly a high-boiled batch—without artificial aid. The addition, during the mixing process, of 0·08 per cent. lecithin will ensure homogeneity. This is a tip worth noting.

Sources of Flavour

Reverting to the recipe and the process, the first thing one notices is that the milk is not actually boiled and is only subjected to quite a mild heat treatment for a short period. This, naturally, has an effect on the flavour of the product. Instead of the usual cooked (milk pudding flavour, if you will) effect, the flavour of the finished goods is very reminiscent of the original condensed milk. The choice of a good, full-flavoured condensed milk is, as will be appreciated, of first importance in any recipe employing this process. Separated milk will not serve as an alternative for obvious reasons. Much of the flavour is derived from the sugars—hence the presence of a percentage of brown sugar. The exclusive use of brown sugar is ruled out by the fact that the sugar glucose batch has to be boiled to approximately 300° F. White sugar alone, without the support of caramelised condensed milk, would give a very characterless product. The balance between the ingredients is arrived at by considering that there is less inversion of the sugar, owing to the speed of boiling under this method, and that there can only be a negligible amount of inversion of the sugars in the milk. There is sufficient fat and casein to give adequate body and, although the moisture content of the milk is left undisturbed, it is

(*Continued on page 272*)



Hansella Vertical Mixing and Boiling Pan.
(*Courtesy: Baker Perkins, Ltd.*)

The exterior of TATE AND LYLE'S new Pan House, one of the tallest buildings in the South of England and the most up-to-date sugar refinery in the world is shown above. In its interior is incorporated the latest advances in pan-house design which has produced as large a degree of efficiency for the personnel as any that has been achieved in this country. The building is supplied with washed and filtered air and all vapour produced within is removed by a fan at the source. For the plant, stainless and nickel-clad steel has been used freely where risk of contamination is greatest. Clean design largely obviates the possibility of contamination; and carefully-planned accessibility of plant and cleaning arrangements reduce the risk of its occurrence to a minimum.

PURER SUGAR

T. CROSBIE-WALSH, *F.I.C.*

FROM far-flung parts of the world—Cuba, British West Indies, Mauritius, Australia, Java, as well as our native beet lands—comes the brown raw product to be refined into the familiar pure white sugar of commerce. There is no sophistry about the word "pure" as it means a product containing 99·97 per cent. of sucrose.

An endless stream of jute bags, each containing two or three hundredweights of raw sugar, which looks like Demarara sugar, is discharged on Tate and Lyle's Plaistow wharf.

The bags are tipped into concrete silos having a capacity of 3,500 tons. *En route* to these they are subjected to the important operations of weighing and sampling.

The Magma Mixer

From the base of these silos the raw sugar is conveyed by means of an endless conveyor to a mixer, where the first item of the long and complicated set of operations in the purification process is carried out.

The sugar is mixed into a magma with raw syrup. Screw conveyors carry this mixture of crystals and syrup to high-speed centrifugal machines in which the syrup is spun off, leaving a cake of sugar. This cake is washed with hot water to remove the last traces of syrup. By this last washing, the outer layer is dissolved, and with the solution much of the impurities pass into the syrup with the wash water.

This syrup still contains valuable crystallisable sugar. It is evaporated in vacuum pans and the resulting *massecuite* passed through the centrifugals, where a further quantity of crystals, which are added to the first lot of washed sugar, is obtained. This operation is repeated once again, after which the centrifugalised syrup is of so low a purity that no further sucrose can be obtained, and it is sold as molasses.

Lime and CO_2 Treatment

The washed sugar from the centrifugals is "melted" with distilled water. In the sugar industry sugar is "melted" in water and not "dissolved", and the apparatus in which solution is effected is called a melter . . . a curious survival of old nomenclature.

The liquor is passed through a copper strainer where all insoluble and foreign matter, such as string from the bags, is removed and thence to the carbonation tanks.

In these tanks a cream made from slaked lime is added and intimately mixed with the liquor, after which carbon dioxide gas is bubbled through it, which converts the lime into a precipitate of calcium carbonate which takes up a number of impurities.

The calcium carbonate with its accompanying impurities is removed from the liquor by heating it to 100° C. and filtering it through filter presses, the cloths of which are coated with kieselguhr to assist the filtration.

Charcoal Filtration

The liquor issuing from the filter presses is of a light brown colour and must be further decolourised, and otherwise purified.

Through cisterns with conical bottoms, containing thirty tons of bone charcoal the liquor passes, leaving further portions of colour and impurities behind.

Purification of Charcoal

After a period of use, the charcoal loses its necessary qualities, and the method of its "revivification" merits description here.

The cistern is emptied of syrup and the charcoal washed until no trace of sugar is found by test in the emerging washing water. Through a door in the bottom of the cistern the charcoal is dug out and conveyed to the hoppers on top of the kilns by means of a conveyor.

The kilns consist of a number of vertical pipes, around the top half of which flue gases circulate. In the bottom half the revivified charcoal is cooled as it falls by induced draught to the fire. The temperature in the hottest part of the tube is usually about 550° C. and is sufficient to remove the colouring matter and other impurities which have been absorbed from the sugar liquors. The coolers discharge the charcoal into hoppers, and it is then returned to the cistern heads ready for recharging.

This is the end of the raw sugar side of the business, which is carried out in a separate building. The water-white liquor is pumped to storage tanks, which feed Tate and Lyle's new pan house.

The New Pan House

This building, an impression of which is gained from the illustration, was started in 1934 and completed in 1938. It is 205 feet high, has ten actual floors and eighteen landings, and is one of the tallest buildings in the South of England, and the most up-to-date sugar refinery building in the world.

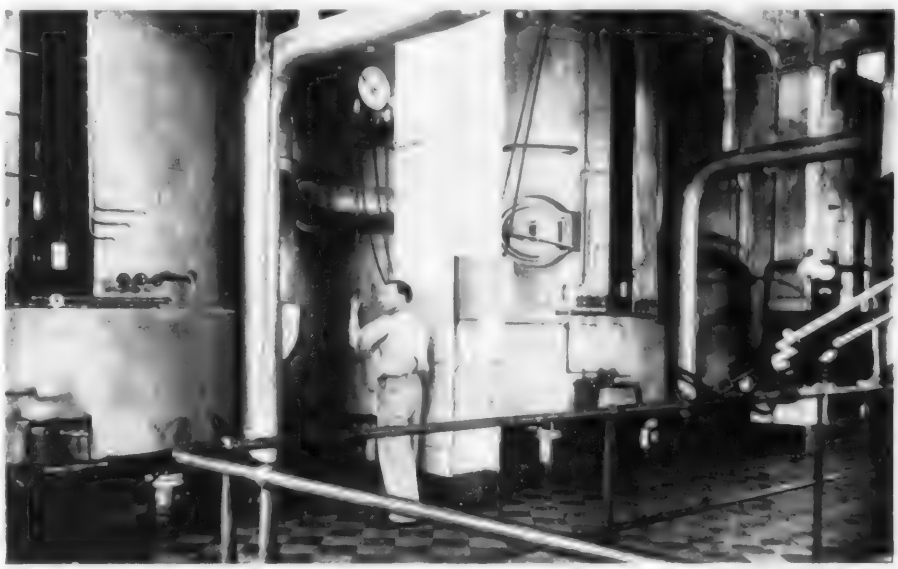
Air-conditioned throughout, it incorporates the latest advances in pan-house design, possessing as great a degree of efficiency and comfort for the personnel as has been achieved in this country.

The main impression gained by an inspection of the interior is the extraordinary efficiency with which the separate operations are carried out and also the extreme precautions which have been taken against any possible contamination.

The building is supplied with washed and filtered air, and any vapour that may escape into the building is removed by a fan at the source. Clean design largely obviates the possibility of contamination and carefully planned accessibility and cleaning arrangements reduce the risk of trouble to a minimum.

Stainless and Nickel-Clad Steels

Stainless and nickel-clad steels have been used freely where risk of corrosion is greatest. The valuable properties of malleable pure nickel have long been utilised in the food manufacturing industries for plant which



". . . Fed from storage tanks are vacuum pans in which the syrup is boiled to crystals at low temperature. A vacuum of 28 inches can be maintained by a surface condenser working in conjunction with a pump-evacuated jet condenser."

must be strong and highly resistant to corrosive attack. Nickel-clad steel plate is a highly economical means of securing the advantages of nickel for heavy plant. It consists of a comparatively light layer of pure, solid nickel permanently bonded to a heavier layer of steel. Nickel-clad steel is essentially a hot-rolled product and is only available in thicknesses down to 3/16 in. The finish on the nickel is similar to that on hot-rolled nickel plate and must not be confused with the bright lustrous finish of the thinner cold-rolled nickel steels.

The work of the pan house goes on all round the clock, and the lighting has been given the most careful consideration. The lights are housed in hoods of steel, and "Perspex", a transparent unbreakable plastic, with fine wire mesh panels for ventilation. The result is that the illumination is all that can be desired and danger from broken glass is eliminated. The building itself is finished inside all over with white Permoglaze paint.

The function of the pan house is to effect the crystallisation of white sugar from the liquor from the charcoal cisterns, the operation of which has been described.

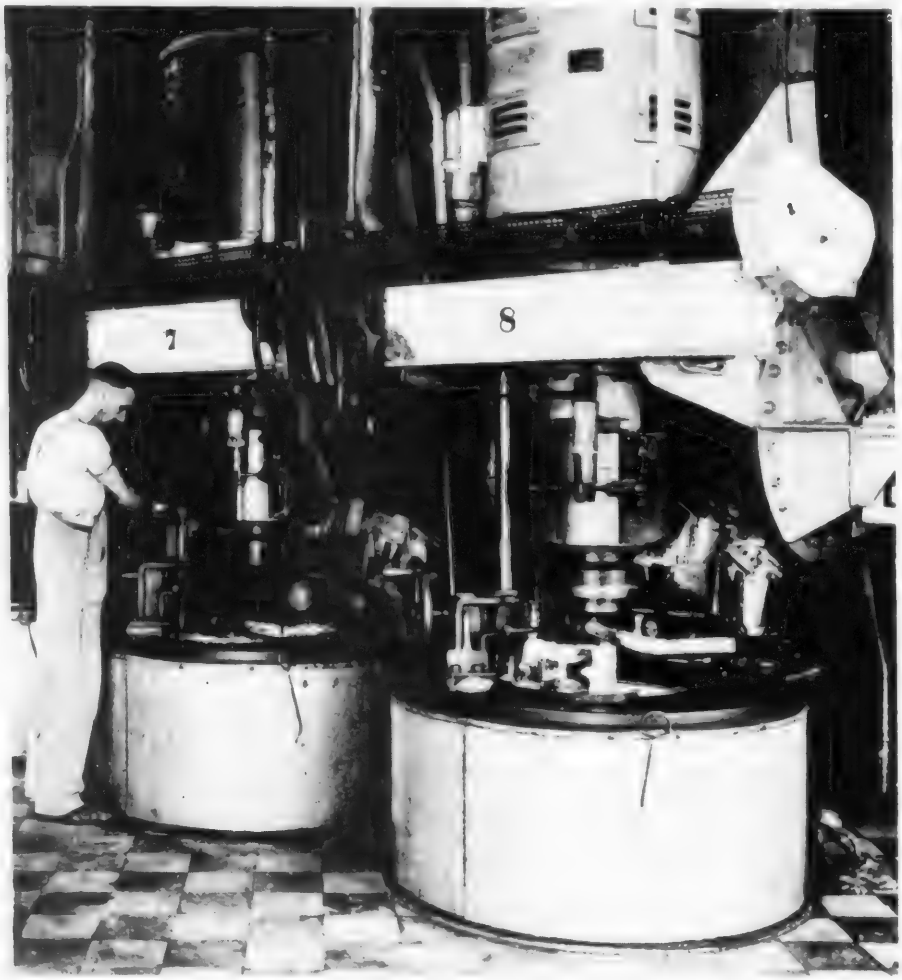
Evaporation of Liquor

Fed from storage tanks by means of valves in the bottoms of each are four vacuum pans in which the syrup is boiled to crystals at a low temperature. Three of the pans have a capacity of 1,500 cubic feet, and the fourth is a smaller one of 850 cubic feet. The pans are heated by means of eight especially designed elements and shell bottom jackets, making a heating surface of 1,720 sq. ft. Steam is supplied to the elements at 70 lbs. per sq. in., the condensate being flashed off at 6 lbs. per sq. in. A vacuum of 28 ins. can be maintained by a surface condenser, working in conjunction with a pump-evacuated jet condenser.

By the manipulation of vacuum and liquor, the operator can obtain a sugar of uniform grade and size without boiling at low vacuum, which is wasteful of steam and also tends to spoil the colour of the sugar. Entrainment of sugar in the vapour may cause considerable loss, and a trap of nickel-clad steel is provided to prevent this.

The design of the elements enables very heavy *massecuite* of 92 per cent. solids to be dropped without difficulty, with the result that sixty tons of *massecuites* are obtained per boiling, of which about 60 per cent. is crystals.

At the bottom of each pan is an electrically operated butterfly valve, through which, when the vacuum has been broken, the sugar falls into a nickel-clad steel drum



". . . The *massecuite* is conducted to a battery of centrifugal machines which are driven by induction motors giving a speed of 1,200 r.p.m."

". . . While the motor is running at slow speed the crystals are discharged with a plough into a stainless steel 'shaker', or inclined reciprocating trough, which collects the sugar from a number of machines and delivers it into a rectangular hopper. . . ."

which is fitted to a spiral stirring gear which mixes the saturated syrup with the *massecuite* and thus enables it to be handled with greater ease.

Centrifugalising the Massecuite

From the mixer the *massecuite* is run into a feeding trough which supplies the battery of centrifugal machines. These machines are fitted with a copper, brass, and a monel metal cloth, and are driven by induction motors giving a speed of 1,200 r.p.m., which enables the cycle of operations to be operated automatically, including the washing of the walls of sugar with hot water.

While the motor is running at slow speed the crystals are discharged with a plough into a stainless steel "shaker" or inclined reciprocating trough, which collects the sugar from a number of machines and delivers it into a rectangular hopper.

Drying the Sugar

The sugar at this stage has a moisture of about 1·2 per cent., which must be reduced considerably before being ready for packing, otherwise lumps would form when the sugar cools. In order to dry the hot damp sugar it is fed into long rotating steel drums or "granulators", to the sides of which are attached small vanes which carry the sugar to the top and allow it to fall through the warm, dry air which is blown in at one end.

A band conveyor fed from a self-sealing hopper at the end of each granulator carries the sugar to a screen which removes the largest lumps. The crystals are then separated into two sizes by means of a wind-separating plant, which consists of a long tunnel through which air is blown at a constant speed; the sugar is sprinkled into the air stream, and the smaller particles fall into the further hopper and the larger into the nearer one.

After granulation, sugars from first, second and third syrups are mixed together and after grading are ready for filling. The sugar then contains about 99·97 per cent. sucrose, and a typical analysis is:

Sucrose	99·97 per cent.
Reducing sugars ..	0·008 ,, ,,
Ash	0·009 ,, ,,
Organic non-sugar ..	0·013 ,, ,,

For market the sugar is packed in either 1- or 2-cwt. bags or else in cartons. All the cartons are made from rolls of thin card by the same machines that weigh, pack and seal them, so that the sugar is untouched by hand from the time it leaves the pans until it leaves the refinery in sealed and wrapped cartons.

SOME SUPPLIERS TO THE FACTORY OF TATE AND LYLE, LIMITED

Condensers: Hick Hargreaves and Co., Ltd.
Pans: J. Adamson and Co., Ltd.
Air Pumps: Gimson and Co., Ltd.
Mixers: G. A. Harvey and Co., Ltd.
Mixer Drives: Renold and Coventry Chain Co., Ltd.
Centrifugal Machines: Gimson and Co., Ltd.
Granulators: Gimson and Co., Ltd.
Conveyors: Gimson and Co., Ltd.
Air-Conditioning Plant: Carrier Engineering Co., Ltd.
Passenger Lift: Express Lift Co., Ltd.
Turbines: Belliss and Morcom, Ltd.
Alternators: British Thomson-Houston Co., Ltd.
Switchgear and Panels: British Thomson-Houston Co., Ltd.
Overhead Cranes: Ransomes and Rapier, Ltd.
Water-Tube Boilers: Stirling Boiler Co., Ltd.
Fans: James Howden and Co., Ltd.
Automatic Control and Instrument Panel: G. Kent., Ltd.
Feed Pumps: Mather and Platt, Ltd.
Evaporators: G. A. Harvey and Co., Ltd.
Deaerators: Hick Hargreaves and Co., Ltd.
Heat Exchangers: Gimson and Co., Ltd.
Settling Tanks: G. A. Harvey and Co., Ltd.
Regulators: British Area Regulators, Ltd.
Steam Piping: Stewarts and Lloyds, Ltd.
Lagging: Cape Asbestos Co., Ltd.
Valves (Steam): Hopkinsons, Ltd.
Paint-Permoglaze: Glazebrooks, Ltd.
Perspex: I.C.I. (Plastics), Ltd.
Steel Works (Building): Dorman Long and Co., Ltd.

THE CONFECTIONERY TRADE IN 1938-9

The increasing popularity of cigarettes and ice-cream: the mad competition in the chocolate trade, are some of the problems which have faced the Confectionery trade during the past year. These and other aspects are discussed in this frank article by

N. F. SCARBOROUGH, A.M.I.Mech.E.
Author of "Sweet Manufacture"

DESPITE assurances of better trade, few will be found to deny that the past year or two have been a very trying time as far as the confectionery trade is concerned, and the numbers of firms who have gone into liquidation or abandoned production during this period bears witness to this fact. How far this decline in business is avoidable and how far it is due to the changing habits and circumstances is very difficult to estimate. It seems quite clear, however, that the very great increase in hire-purchase transactions for the acquisition of almost every kind of commodity is bound to have a certain effect in mortgaging loose money that was formerly diverted into the retailer's till.

Enemies of Confectionery

A further factor is probably found in the increasing devotion of both sexes to the ubiquitous cigarette. A visit to any cinema reveals also a large demand for various kinds of packeted ice-cream and other similar novelties, all of which seem to have largely replaced chocolate and confectionery as an accompaniment to the latest thriller.

At the same time it is very seriously suggested that a large amount of the decline in the sales of many kinds of confectionery products is due not to any outside cause but to factors directly under the control of the trade itself.

Mad Competition

First of all, the mad competition that the chocolate trade has seen over the past few years evidenced by the constant price reductions and increases of weight bears witness to the general tendency. The wisdom of this trend is very much open to doubt, and careful enquiry will reveal that a large proportion of former buyers now refrain on the grounds that what was originally a good and palatable article is now merely a rubbishy imitation of its former self. Makers will of course hotly rebut the assertion that these benefits have been attained in any way by sacrifice of quality, but by improved methods of manufacture. This may be true in part, but the fact remains that, taking for instance milk chocolate, the kind generally obtainable has suffered a progressive deterioration and that it is nothing like its predecessor of some years ago. If anyone who doubts this statement is prepared to take the trouble to obtain samples of a good brand of, say, genuine Swiss manufacture, he will be convinced of its truth.

Similar remarks apply with equal force to other forms of confectionery as well as other kinds of chocolate. That the allegation is of course largely true is well known to anyone who has had a working connection with any manufacturing business. A new line is evolved and satisfactorily launched on the market, but before long someone discovers that it might be more profitable if some substitution or modification of the ingredients were made or the manufacturing process were amended to cheapen the cost. So the process goes on until the public eventually refuses to buy and the product has to be withdrawn, possibly by the Official Receiver if matters are allowed to go to their full conclusion. That such is the case a perusal of the advertisements of several trade journals will confirm, with the scores of "improvers", "substitutes", etc., ranging from artificial vanilla to artificial froth for beer.

Secondly, the form in which goods are offered to the public has a greater effect than is often appreciated. It will be said by sales managers that products can exist only by meeting a public demand, which statement is obviously fairly true, but the question of how the public demand is assessed is another story, and one on the face of it without beginning or end.

Assessment of Demand

For instance, some years ago the block or slab packing for toffees was superseded by the fantail wrapped piece, the hygienic and other advantages of which were heralded with much publicity and other forms of salesmanship. To-day we are invited to buy our particular choice, chocolate or what you will, in the convenient quarter-pound or two-ounce block, moulded for easy breaking and handily packed for the pocket. This curious reversal seems to indicate the truth of the statement that the public will only buy what it wants and also that the methods used to gauge public opinion are unreliable in the extreme.

Diligent and detailed enquiry amongst the general public as consumer and the retailer as an important link seems to confirm this view. In fact, one or two of our large makers are apparently aware of the difficulty and

have submitted samples to and invited opinions from some thousands of members of the general public before launching a new assortment on the market. The smaller manufacturer, who relies on the usual wholesale channels for the distribution of his products, is not in a position to engage in any such costly experiments, and it is suggested in all seriousness that for the following reasons he is often out of touch with the real public demand. In the first place, he is dependent for information on his travellers, who, profit margins being what they are, cannot afford to indulge in experiment but rely on the wholesale traders who adopt the same attitude. Human nature being what it is, the information the manufacturer gets from the operation of this cycle is purely of a negative kind in that he learns from bitter experience which of his products will not sell but can get no idea of what might sell if only he were in a position to produce it.

The Consumer End

Looking at the matter from the other end of the chain, namely from the point of view of the ordinary individual who is prepared at various times to part with hard-earned coppers, similar difficulties seem to exist in registering disapproval of some departure from the desired variety other than abstention from purchase. How the difficulty is to be surmounted is not at all clear, though there is little doubt that a carefully worded questionnaire addressed to the public in the form of an advertisement, coupled with small prizes for the most satisfactory completion, would produce some most enlightening results in a good many sections of the trade. Perhaps one day some firm will have the courage to institute such an enquiry.

In the meantime it may be of interest to remark on a few points which emerge as a result of careful enquiry amongst the retailing and consuming end of the trade. These points are raised here in the form of questions and they are offered not as solutions but as food for thought, as follows:

(1) Is not the slab form of production more an aid to cheapened production rather than a reply to popular demand?

(2) Does the public really want the elaborate foiled and wrapped pack that almost needs a can-opener to open?

(3) Is the demand for quantity at the expense of quality really representative?

(4) Is the odd-priced line really the bogey the wholesale trade would have us believe, bearing in mind current cigarette prices?

Correspondence

THE RIDDLE OF THE SAUSAGE

The Editor,

DEAR SIR,

In your July issue I noted an article by Mr. Frank Gerrard dealing with sausage manufacture. I am not competent to discuss its technical features as I am engaged in a quite different branch of edible products—*i.e.*, chocolate and confectionery manufacture—but I am interested as an occasional consumer of an article of diet whose fame was enhanced by Lord Baldwin's reference to it in the House of Commons, constituting the *bon mot* in a classical allusion.

Also the article offers the opportunity of raising the wider question of legal definitions of described foods in general. Let me say straight away that Mr. Gerrard is undoubtedly a very eminent authority in all that pertains to meat and I recognise him as a valuable influence in support of maintaining and raising the all-round standard of foodstuffs, especially preserved foods.

Consequently I shall be absolved of any desire to criticise him for the ends he and I would attain, but I differ from him as to the means. He twice makes the unsupported statement that certain changes might not meet public demand, or by implication, that there is no public demand for such changes. In this attitude he is in good company. Most of us wishing to resist any trade alterations inimical to our habits or interests invoke that convenient but unprocurable witness "the public". The plain fact of the matter is that the public rarely sets in motion any change of its own volition, but does or does not support a lead.

To deal with the first instance under the heading "Binders": that euphemistic word must be a blessed one to manufacturers, but Mr. Gerrard should have demonstrated that the use of this starchy and pasty article is considerably abused. It is far cheaper than meat and has no palatable advantage. If farinaceous products were more expensive, then pork or beef manufacturers would soon produce good sausages without them. As it is, it is the ruination of sausages. In view of the fact that the British public is rarely, if ever, afforded the opportunity of purchasing an all-meat sausage of British make at a popular price, I do not see how Mr. Gerrard can assume the public reaction. If it is a matter of guess-work, I guess in the opposite direction to him, with better chances of being right.

I thoroughly disagree with him in his doubt as to the public reception of stricter regulations and restrictions in the sausage trade as a whole. I have no doubt many manufacturers would oppose any changes, but naturally I, as a consumer, am not interested in their views.

My long-entertained conviction is that of all forms of food preserving the sausage industry could do with a complete overhaul from the point of view of definitions and standards, to the considerable advantage of the best firms in it. In solemn terms I pose the clear and simple question, What is a sausage? Becoming even bolder I even ask, What should a sausage be? To these questions, like the riddle of the universe, there is no answer at present.

I remember discussing the general question of the legal definition of food products with the chief of the inspector department of one of the most important London civic authorities, and in his office he pointed with envy to a collection of books containing particulars of the U.S.A. food laws and regulations which he highly commended, and instanced in particular the clarity and satisfactory nature of the laws controlling the sausage and allied industry. He condemned at the same time and in severe terms the limitation of his own powers and the astonishing lack of legal standards and definitions of these and other foods.

The worst fate I can prescribe for some of the individuals whose sausages I have sampled but could not consume is that they should be made to eat them. Alas, the sausage trade and the confectionery trade have some black sheep among their flocks, not to mention those whose wool is hardly white, and it is against their activities, I consider, the high-grade manufacturers and the public should be protected.

Yours faithfully,

(*Signed*) W. D. DUFOUR.

LONDON, W. 1.

POP CORN

The principle of the "pop" has long been known and has been borrowed by man for the preparation of other cereals, of which the best known are "puffed" wheat, rice and oats.

Here it is described in connection with maize in a practical article by

E. J. THOMAS

IN THAT monumental work of his, *An Outline of History*, H. G. Wells remarks to the effect that while the early peoples of the Old World grew and ate wheat, the American Indians must have developed their agriculture independently, for they never had wheat. The typical grain of the New World was maize, or Indian Corn.

The early white settlers on the new continent soon found that the new grain was palatable and nourishing and that it was by no means the least of the wealth that their adopted land offered. The value of maize both for food and for other purposes was soon realised by the Old World where to-day, no less than in its native land, it occupies a place of importance amongst the grain foods of mankind.

Maize as Sweetmeat

There is a variety of maize which is made into Pop Corn. Its consumption in the United States and in Canada reaches considerable proportions, and although it is well known in this country its popularity cannot compare with that it enjoys in the countries mentioned.

It can, of course, no more be regarded as a staple article of diet than can such edibles as sweetmeats, ice-cream and nuts. Like those articles it seems to be consumed more perhaps for the gratification of the sense of taste, or as a pastime, than to supply actual nourishment. Also, in the social life of those countries, it would appear to fulfil the same functions and occupy much the same position as, say, chestnuts, muscatels and almonds, and peanuts do in this country. Over there no Hallowe'en party is ever quite perfectly accomplished in the absence of the little white kernels whose transformation into the fluffy white bursts is as æsthetic a joy as the scorching of chestnuts between the bars of the grate at a different season is to us. No baseball or football game can ever be so thoroughly enjoyed by the spectator who, in between the cheering, cannot repair to his bag of butter-drenched, salted corn. Every outdoor gathering is attended by the inevitable pop-corn vendor with his glass-topped handcart piled high with the freshly popped corn. Nor can he be easily mislaid, so distinctively is his ubiquitous presence proclaimed by the constant shrill of his tiny steam whistle. At night his paraffin flare is a cheery beacon, and it is well worth the expenditure of a "nickel" on his wares to experience the enwarming glow—psychological, no doubt—that a pause at his street-corner pitch provides.

Popping Variety

Pop corn is defined by the Encyclopædia Britannica as *Zea Mays*, variety *everta*. It grows in ears proportionately smaller in size to the ears of "dent" corn as the grain of the former is compared to the latter. The grain itself consists essentially of a mass of starch granules together with a rather small embryo or "germ" containing about 5 per cent. of oil, which are enclosed by the endosperm. It is to the peculiar consistency of the endosperm, and the moisture content of the kernel that the peculiar behaviour of pop corn is generally attributed. Of late, however, research is being instituted

The corn is poured into the opening in the central revolving drum of this popping machine, by means of a special scoop. The drive is through special reduction gearing, and the motor can be seen on the bottom frame-work of the machine.

(Courtesy: Wm. Brierley, Collier and Hartley, Ltd.)

with a view to ascertaining whether the desirable popping qualities of the grain are not contributed to by some peculiarity in the starch grain formation, but up to now there have been no definite results achieved along this line of investigation.

The principle of the pop has long been known and has been borrowed by man for the preparation of other cereals, of which the best known are those such as "puffed" wheat, rice and oats. It is explained thus: On heating the kernels, the moisture contained in the starch is converted into steam. For a while the expansion is held in check by the endosperm until the internal pressure becomes so great as to rupture it. Upon the resulting release of pressure, the starch mass bursts through, expanding as it does so to fifteen or twenty times the original size of the kernel. In the process of expansion, the endosperm is forced outward and backward upon itself and the grain appears to have been turned inside out—hence the name for the variety, *everta*.

Pearl and Rice Types

There are two kinds of pop corn. Those whose kernels are rounded and smooth are known as the "pearl" type, and those with pointed kernels the "rice" type. The following table distinguishes between them:

Type.	*Commercial Name.*	*Description.*	*Average Popping Volume.*
Rice	Japanese hulless	Slender kernel, thin hull	20·3
Rice	White Rice	Pointed kernel, medium hull	17·0
Pearl	Spanish	Large kernel, thick hull, coarse texture	14·1
Pearl	Dynamite, or South American	Large rounded kernel, thick hull, coarse texture	16·0
Pearl	Yellow Pearl, or Queen's Golden	Medium sized, rounded kernel, medium hull and texture	20·3
Pearl	Sunburst	Similar to Yellow Pearl	20·9

The last-named was developed by the U.S. Department of Agriculture in co-operation with the Kansas Agricultural Station. Selections of seed and tests were carried on by agronomists of the Station for a period of seven years before the champion pop was evolved in 1929.

It is difficult to single out any one particular variety as the most popular. A great deal depends upon the purpose to which it is to be put, and that most fickle of factors—the public taste. White Rice was once a great favourite, but lately the pearl varieties, despite their thicker hull and rather coarser texture of the burst, have succeeded in popularity the—palatably speaking—more delicate kinds.

Pop corn is not grown extensively in Canada. Most of the commercial varieties can be grown, but except for the more climatically favourable southern portion of Ontario, seasonal conditions are generally too severe for its proper development. The chief centre of production is the United States, where it is fairly generally grown throughout the Middle, Middle West and West. The States of Kansas and Iowa contribute a large share of the total production. South America also is an important source of this commodity.

Price Fluctuations

The price which pop corn commands varies considerably from year to year. Acreage being at no time controlled, a fair price one year is almost invariably an incentive to growers to increase their production the following year, and consequently overproduce. When low prices obtain as a result the "haphazard" grower is likely to refrain from planting the next year, when better returns will naturally reflect smaller stocks. An example of the fluctuation of prices might be cited in the fact that in 1932 the crop averaged as little as 1 cent (one halfpenny) per pound. Late in 1934 the price per pound exceeded 8 cents (fourpence). The larger growers in the more important areas, those whose experience can be depended upon to supply corn in good condition for popping, usually grow under contract, and it is from them that the bulk of the production comes.

For the popping of corn in any great quantity plant similar to that used for roasting peanuts is suitable. The most essential features would include the constant agitation of the kernels, very flexible means of controlling the heat and, where a large batch is cooked, facilities for rapidly cooling the popped kernels. Failure to provide for this must inevitably result in bursts, where a dingy brown colour replaces their appetising whiteness and the sacrifice of crispness for toughness. Separation of the full bursts from those that are not so full, and then again of the latter from those that pop but little or not at all, is obviously arranged for by means of suitable graduated screening. A simpler form of popper in quite common use in sweet factories, where the quantity of corn popped would not justify a more expensive installation, is the manually operated basket shaker. Such an apparatus consists of a rectangular basket constructed of light angle iron framework over which is stretched 20-mesh wire cloth in a fairly heavy gauge wire. Suspended by a rope or chain at a height convenient to the operator, it is mounted over a large open gas ring or the usual gas-fired type of confectionery cooker. The basket is fitted with a handle with which it can be shaken to thoroughly agitate the contents for the duration of the roast, which may last for from five to ten minutes. Such an arrangement would not be suitable for the manipulation of more than about ten pounds of corn at a time. The dimensions of the basket should embrace at least twenty-five times the volume of unpopped corn it is to contain.

Popping Needs Skill

The actual popping of the corn is, like so many other cooking processes, one which depends for success largely upon the skill of the individual. Experience is essential and can only be gained by practice. Variations of the moisture content of the kernel, the optimum temperature and the rate at which it can be transferred to the kernel without unduly drying it and also without scorching it, the thickness or strength of the endosperm, which varies

considerably with the particular kind of corn that is being popped—these are the chief factors which must be dealt with by the operator at the time of the roast and whose successful co-relation make the perfect pop. Actual experiment with small quantities is the quickest way to learn and much the surer method than the perusal of pages of written instruction. Nor is the method costly.

Pop corn can be incorporated in many sweets either in conjunction with, or to replace entirely, some of the more usual non-sweet ingredients such as nuts and dried fruits. Its possible combinations are almost limitless. Two items, popular on the other side of the Atlantic, serve to illustrate a starting point for the evolution of other novelties of a similar nature. The formulæ given, especially in regard to the relative proportions of the sugars and their cooking temperatures, are given only as a guide, and one dares greatly, indeed, even to suggest that they may be typical. Modification in some way or another by the individual to suit his own purposes is not only almost a certainty, but is recommended—such is the art of sugar boiling or sweetmaking!

Pop Corn Crisp

Sugar	5 lb.
Glucose	5 ,,

Cook to 260°-265° F., or "crack". Add a sufficiency of salt and stir in about 10 lb. fully popped corn. Transfer at once to slab. Chill first one side of batch, then the other, when spread to the desired thickness to cool. Flavour as desired.

Pop Corn Balls

Sugar	6 lb.
Glucose	4 ,,

Cook to 250°-254° F., or "medium crack". Stir in 15 to 20 lb. fully popped corn. Transfer at once to slab. Work into balls about six inches in diameter by hand as soon as cool enough to handle. In this recipe the corn is sometimes tinted with a weak aqueous solution of one colour or another. Avoid overcolouring, though, and tint the corn before it enters the rest of the batch. Flavour with vanilla, orange, lemon, etc., as desired.

Keeping Properties

While unpopped corn keeps fairly well, some care should be taken in the storing of stocks. If the weather is very dry and the stock is subject to any warmth it is liable to lose moisture by evaporation to an extent that will seriously impair its popping qualities. The best pop occurs when the moisture content of the kernels is 13 or 14 per cent., and a loss of even 2 per cent. makes a great difference. This factor should not be lost sight of if the kernels are marketed unpopped in packages for home popping. To counteract, as far as possible, deterioration by moisture loss, a reasonably airtight package should be provided. One of heavy waxed cardboard protected by moisture-proof Cellophane would be suitable for this purpose.

If stocks happen to become too dry to pop well, they may be re-conditioned by soaking the kernels in water for eight or twelve hours, after which they are spread out to dry in a thin layer which is frequently stirred to ensure even drying. Small metal-lined bins form the ideal two-fold protection, during storage, from moisture loss and the attentions of rats and mice.

Lastly, when purchasing stocks, care directed to a few general points is well repaid. Evidence of befoulment by vermin should, of course, be entirely absent, as also should any significant quantities of dust. The prevailing odour should be definitely that which is typical of all grains, with no traces of mouldiness either by inspection or by smell. A representative sample should, if at all possible, be obtained and experimentally tried for popping qualities and the percentage of failures in a small wire hand popper. If laboratory facilities are available, determination of the moisture content by any of the recognised tests is a helpful guide to the worth of the sample.

Acknowledgments

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Milk Factory Effluents

One of the most important of the Water Pollution Research Board's investigations is the work which is being carried out, in collaboration with the milk industry, on the treatment and disposal of waste waters from dairies and milk products factories. These waste waters have in the past caused serious pollution of streams into which they have been discharged. In 1935, after preliminary laboratory experiments, the Board erected two large-scale experimental plants at a milk collecting and distributing depot and cheese factory at Ellesmere, Shropshire. Previous annual reports have described the treatment of milk washings from the milk depot—that is, the waters used for washing churns and other equipment, and which, after use, contain considerable quantities of milk. It was shown that these liquids, which are difficult to treat by the method of biological filtration as ordinarily applied at sewage disposal works, could be satisfactorily purified when passed at a controlled rate through two percolating filters in series; the order of the filters in series is reversed periodically in order to prevent the accumulation of excessive amounts of solid matter in the filters. During the past year the waste waters treated have contained whey washings, which are produced during the manufacture of cheese. These washings are rather more difficult to purify than milk washings, but effluents of excellent quality have been obtained. With the method of treatment of two percolating filters in series the quantity of polluting matter which can be treated daily in filters of a given size is considerably greater than is usual in the treatment of sewage at a sewage disposal works, where the liquid is passed through only one filter. The new method has been adopted and is in satisfactory operation at a number of milk depots and cheese and butter factories. During the period 1935 to 1938 the industry contributed approximately £10,000 towards the cost of the investigation.

This new method of operating percolating filters has also aroused great interest among those concerned with the treatment and disposal of town sewage. The Birmingham, Tame and Rea District Drainage Board, which operates filters of a capital cost of nearly £1,000,000, has placed a new laboratory and suitable large-scale plant at the disposal of the Board, in order that treatment of sewage by the new method may be tried on a large scale. The whole of the cost of the new laboratory and of necessary additions and modifications to the plant has been met by the Drainage Board.

ROTHAMSTED EXPERIMENTAL STATION

Enthusiastic teams of scientists under the direction of SIR JOHN RUSSELL are trying to solve many abstruse problems which confront agriculture, not only in these Islands but in the Dominions and foreign countries.

The dread virus diseases, a menace to many food plants, are being energetically studied, as well as almost every other conceivable aspect of the science and art of growing food.

THE Rothamsted Experimental Station was founded in 1843 by the late Sir J. B. Lawes, who was associated with Sir J. H. Gilbert for a period of nearly sixty years. Lawes died in 1900 and Gilbert in 1901; they were succeeded by A. D. Hall from 1902 to 1912, when the present Director, Sir E. J. Russell, was appointed.

The main block of laboratories was opened in 1919, and is mainly devoted to the study of soil and plant nutrition problems; another block was erected in 1924 for plant pathology, and a house adjoining the laboratories has been converted into an administration building to hold the Imperial Soil Bureau, part of the Records and Statistical Department, Staff Common Room and Conference Room.

From time to time, large glasshouses, including special insect-proof houses for virus studies and plant pathology investigations, have been added.

The activities of Rothamsted are not confined to the British Isles but are gradually spreading out to the Empire and other countries abroad. The International Education Board sends workers from all parts of the world to study in the laboratories, and more and more workers are coming from Overseas Dominions.

On June 28 last visitors were given an excellent opportunity of inspecting the laboratories and experimental fields of the Station, and of hearing first-hand of the wide range of research and the methods by which it is being carried out.

The Sample Room

Shelves around this room are filled ceiling high with samples of soils which have been examined. Carefully classified, they date back almost to the year 1843, when the Station started, and their number runs into thousands. Along tables in the centre of the room were seated a number of girls, busily engaged in examining grasses from experimental plots, separating out the various species—an expert job.

Nitrogen Fixing Bacteria

The Bacteriology Department is studying the nitrogen fixing bacteria which produce nodules on leguminous plants.

The legumes are important things for the food manufacturer, and hence the value of such work as the mechanism of root infection by the nitrogen fixers and the effect of the plant's physiology in determining the activity of the bacteria within the nodule.

It has been found that there are certain strains that fail to fix adequate amounts of nitrogen and do not help the plant and, moreover, that there is an active competition for nodule production between beneficial and non-beneficial strains of the bacteria, which may render artificial inoculation ineffective. The isolation of a strain of bacteria which remains unaffected by the poorer strains has been achieved.

In the same laboratory investigations have been made dealing with the total population of the bacteria in soil and its fluctuations from hour to hour, and a microscope method of counting bacteria in soil has been evolved which gives numbers ranging from 1,000 to 4,000 million bacteria per gram of soil.

It is a commonplace that scientific investigations properly carried out are apt to develop in wholly unexpected directions. During the work of denitrification a key was provided to a particularly difficult practical problem confronting two branches of food production—the purification of effluents from sugar-beet and milk factories. For several years this matter was followed up at Rothamsted by arrangement with the Department of Scientific and Industrial Research, the work being done generally by the Microbiological and Fermentation Departments with the co-operation of Anglo-Scottish Sugar-Beet Corporation (Colwick) and United Dairies, Ltd. (Ellesmere).

Insecticides and Fungicides Department

In this department is carried out the study of the insecticidal action of plant extracts and synthetic organic derivatives. Also the isolation of the active principles of insecticides of vegetable origin and determination of their chemical and physical characteristics.

Other avenues of research are the chemical means of evaluating rotenone-containing insecticides; the mode of action of insecticides, etc.

A valuable contribution to the Symposium on "The Trend of Progress" recently held during the Annual Meeting of the Society of Chemical Industry, was given by Drs. J. T. Martin and F. Tattersfield, of this department, on July 13. The authors surveyed the knowledge of insecticides to date.

The action of the Public Health Authorities in insisting upon limits of tolerance of both lead and arsenic in food has stimulated the search for these substances as stomach poison insecticides; but this is not proving a simple matter. Lead arsenate ($PbHAsO_4$) can be produced in an extremely finely divided state and of standard quality. With the exception of calcium arsenate, which has particular uses, the efforts to replace lead in its molecule have not shown outstanding success.

In the search for organic substitutes many hundreds of synthetic compounds have been tested, of which phenothiazine (thiodiphanylamine) has aroused the greatest interest.

Contact Insecticides

Of contact insecticides, those most commonly in use are of vegetable origin in derivatives of coal tar and petroleum. Nicotene, the rotenone-containing plants, pyrethrum, quassia and petroleum have been used for insecticidal purposes for many years.

Due to the isolation and the determination of the structure of their most potent active principle—rotenone—insecticides of the class to which derris belongs have aroused the world-wide attention of chemists and entomologists.

With regard to synthetics, the authors say that it is not easy yet to evaluate their present status, but since many laboratories are engaged in exploring their possibilities it seems very improbable that they will fall into the background.

Attempts to relate chemical constitutions and insecticidal action have met with meagre success, although one or two simple correlations have emerged.

Physics Department

Important study is being made on the effect of different systems of soil cultivation, including rotary tillage, on soil behaviour and crop development. Also field and laboratory studies of the colloid physics of soil crumbs, their formation and degree of permanence under varying conditions, and the buffer action of mineral and organic soil constituents.

Entomology Department

Investigations by means of traps and other sampling methods of the variations in numbers of insects and the relation of this variation to climatic conditions, are among the wide field of research engaged upon by this department, which has a special section devoted to Bee Research.

Plant Pathology Department

The nature of viruses, their properties *in vitro* and in the plant; the isolation and study of infective liquid crystalline proteins from virus-diseased plants; the physiology of these plants and the movement of virus within the plant and the effect on metabolism, are subjects which are now attracting the attention of scientists the world over and are being tackled energetically at Rothamsted.

The take-all disease of wheat was not so very long ago a pathological curiosity, but has developed into a serious problem. The soil factors influencing the persistence of the fungus in the soil is being examined.

In the course of a short review, only a general idea of the importance of the work being performed by the enthusiastic band of scientists under the direction of Sir John Russell can be presented. Space does not allow of more than mention of physiological investigations, statistical work, general microbiology, field experiments, livestock investigations and many others.

Caramel Toffee Manufacture

(*Continued from page 261*)

balanced by the dryness of the other ingredients which are boiled to 300° F.

It may sound rather strange, it may even appear revolutionary to some readers, but it is not absolutely necessary to rely entirely upon either milk or fat to create body or smoothness. There are other ingredients which can be utilised to supply—or to augment—the consistency and texture. Obviously, cheaper substitutes for the two most expensive materials have been sought, with success, by manufacturers seeking to produce cheap goods at minimum cost. It may be interesting to examine a recipe and method based on this requirement.

Cheap Caramel Toffee

Brown sugar	52 per cent.
Glucose	35 ,, ,,
Hard fat	3 ,, ,,
Separated condensed milk ..	10 ,, ,,

It is immediately apparent that this is a very different recipe from either of the others quoted. Actually, in appearance, consistency and texture it need differ but little from the first recipe for full cream caramel toffee if it is processed correctly.

In the first place, 8 per cent. of the sugar and 8 per cent. of the glucose are taken and, after being boiled to, say, 260° F., the boiled batch is beaten with 0·5 per cent. gelatine (previously soaked in water) to produce a nougat. The balance of the ingredients, together with the remainder of the sugar and glucose, are cooked together in the usual manner to a "crack". At this stage the nougat is added to the batch and as soon as a homogeneous mass is produced it can be poured on to the cooling slabs.

The balance of the sugar and glucose should be noted. Due allowance is made for the fact that all brown sugar is used. Apart from the consideration of low cost, brown sugar is employed for the sake of its flavour. The amount of sucrose contributed by the milk is very little. There is more than normal inversion when boiling low-grade sugars.

The small fat and milk contents will have already been noted. The nougat is the source of both consistency and texture. It also gives the finished product the desirable opacity. From the practical point of view, the whole secret is to boil the nougat portion and the real caramel toffee portion to exactly the same final temperature, and to remove the batch from the boiling pan immediately the nougat is evenly distributed throughout the batch, before it (the nougat) has time to disintegrate.

Throughout this article I have only discussed what might be termed "basic recipes". I have made no attempt to show how fundamental flavours can be improved by the assistance of other materials, ingredients and/or essences, but I do hope that I have been able to divert attention from the standard recipe book to the more useful accomplishment of actually creating recipes to meet local conditions and stated requirements.

CANNED MEATS*

THEIR NUTRITIVE PROPERTIES

(Courtesy: Oxo, Ltd.)

A valuable contribution to the knowledge of the nutritional values of raw and canned meats. In this discussion a comparison is made between the nutritional values of raw and canned meats. All changes in nutritional value taking place in canned meats during sterilisation by heat also occur in the home cooking of meats, to a greater or lesser degree.

G. V. HALLMAN and L. E. CLIFCORN.

MEAT has been an important constituent in the diet of man since prehistoric times. Environment, necessity, personal choice, and medical viewpoint have influenced diets to the extent that some have consisted entirely of meat, while others have contained none. In modern civilisation, meat is usually cooked in some manner prior to serving.

In times of abundance, meat is preserved by drying, smoking, curing, refrigeration. canning or by combinations of these processes. It is of vital importance to those engaged in preservation of foods thoroughly to understand the effect of these processes on the various nutritional factors. Those involved in the canning of meat products are deeply concerned with the effect of canning processes on the nutritional factors in meat.

Raw *v.* Canned Meats

In this discussion a comparison will be made between the nutritional values of raw and canned meats. From this, a better understanding may be secured regarding the nutritional value of raw meat and the changes which may take place during the sterilisation of canned meats by heat. This sterilisation completely cooks the canned product so that it may be consumed cold, or warmed to the desired serving temperature. On the other hand, similar raw meats require cooking. All changes in nutritional value taking place in canned meats during sterilisation by heat also occur in the home cooking of meats to a greater or lesser degree.

Meat is an excellent source of protein. The nutritive value of any protein is directly dependent upon the number and amount of essential amino acids present. The superiority of animal proteins in the diet is clearly shown in tables compiled by Mitchell and Hamilton[1] on the biological value of proteins from various sources. Karl Thomas,[2] who conducted protein utilisation experiments upon himself, concluded that animal proteins were much more important in adult nutrition than cereal proteins. Numerous workers have reported the excellent supplementary value of meat proteins and their adequate nature for maintenance and growth.

Effects of Cooking Meats

The effect of heat and different methods of cooking on the proteins of meat has been studied, although considerable work remains to be done. In most cases this work has been carried out with rats as the experimental animals.

Morgan and Kern,[3] in studying the effect of heat upon the biological value of meat protein, supplemented their test ration at a 7 per cent. protein level with dried and ground round of beef—raw, and cooked in the following manners:

1. Boiled in water at 84° C. (internal temperature).
2. Autoclaved at 15 lb. pressure (250° F.) for 7 minutes.
3. Autoclaved at 15 lb. pressure (250° F.) for 1 hour.

* *From a paper read at the Meat Section of the National Canners Association in Convention at Chicago.*

Does Heat Treatment Decrease Value?

The authors concluded that all three of the heat treatments decreased the nutritive value of the meat protein. An examination of the results shows the following:

	Per Cent. Absorbed Nitrogen.	*Gain in Weight Per Gram of Nitrogen Consumed.*
Raw	67	2·58
Boiled at 84° C. (internal temperature) ..	60	2·41
Autoclaved at 15 lb. for 7 minutes	62	2·44
Autoclaved at 15 lb. for 1 hour	56	1·80

It is obvious that the only significant decrease is that in the case of the meat autoclaved at 15 lb. pressure for 1 hour. There were no significant changes in the digestibility of the beef protein due to heat treatments.

Robinson[4] has pointed out that on a comparative basis the protein content of the average human diet is much higher than that of the rations used in the experiments of Morgan and Kern, and further concludes that at such a level there is very little evidence that will support the belief that temperatures such as those commonly used in cooking meats will affect the protein value to any appreciable extent.

Clifford[5] has reported that if the rapid hydrolysis of meat protein with pepsin or trypsin, or trypsin alone, may be taken as a criterion, meat when raw is in the least digestible condition and that the most easily digested meat is that which has been roasted or grilled until it is just red inside.

Moulton[6] has emphasised the fact that the pre-cook employed in the canning of meat decreases the moisture content, and often results in an increase of about 30 per cent. in the protein content of the canned product as compared to that of the original raw meat.

Effect of Processing Insignificant

In general, it is safe to conclude that the long high temperature processing periods employed in the sterilisation of canned meats may have some effect on the value of meat protein, but from a practical point of view the changes, if any, are small and have no significance in the varied diet of the American public.

There is no evidence to show that canning processes change the food value of fats or carbohydrates in any way. One of the problems in the preservation of meat products is to prevent the development of rancidity, which depends upon the presence of oxygen. Since in good canning practice air is excluded from the product, the development of rancidity in canned meats has not presented a problem. The possibility of anti-oxidants, normally present in beef and pork fats, as protectors against the development of rancidity in canned meats, has been suggested by Newton.[7]

In general, meats are not considered as sources of carbohydrate. However, there are small amounts of carbohydrate in meat, mainly in the form of glycogen. The following carbohydrate values have been reported for beef:[8] muscle 1·36 per cent, brain 1·08 per cent., kidney 0·40 per cent., tongue 1·09 per cent, and liver 2·52 per cent.

Calorific Values

A consideration of the energy value of meat is important. The relative position of meat as an energy food in the diet is shown in the following table:[9]

	Amount Necessary to Supply 100 Calories.
Bacon, smoked	16 grm.
Ham, fat	19 ,,
Sugar	25 ,,
Beef, corned	33 ,,
Ham, lean	37 ,,
Bread, white	38 ,,
Beef round steak	64 ,,
Eggs	67 ,,
Beef (free from visible fat) ..	86 ,,
Milk	145 ,,

Cooking and canning operations have no effect on the calorific value of meats other than that caused by an increase or decrease in the moisture content of the product or by the loss of soluble constituents.

Mineral Content

In regard to minerals, meat is a good source of phosphorus and iron. Meat and meat products are highly efficient in the prevention of nutritional anæmia.[10] Sherman, Elvehjem, and Hart[11] found that the iron in beef and pork, liver and cardiac muscle was 60 per cent. available for the regeneration of hæmoglobin, while that in beef skeleton muscle was 50 per cent. available, and that in blood 25 per cent. available. Liver is also an excellent source of copper,[12] which serves as a biological catalyst in the mechanism of hæmoglobin regeneration. Cooking and canning procedures have no effect upon the minerals in meat.

Following the discovery of the vitamins, scientific research has been directed toward the study of these substances which, although present in relatively small amounts in foods, to-day rank equally in importance with the other constituents.

Vitamin A

Vitamin A is the fat soluble vitamin, necessary for growth, proper eye function, and resistance against infectious diseases. In nature it is found in two principal forms—*i.e.*, vitamin A, from animal origin, and carotene, or provitamin A, mainly from plant origin. Small amounts of carotene are found in many products of animal origin. The adult requirement of vitamin A has been estimated to be in the neighbourhood of from 3,000 to 6,000 international units or 2,000 to 4,000 Sherman units per day.[13]

Both vitamin A and carotene are stable at high temperatures in the absence of oxygen, but are rapidly destroyed by heat if oxygen or oxidising agents are present.

In general, meat cannot be considered a good source of vitamin A. Investigators differ on the vitamin A content of beef and pork muscle, some reporting small amounts to be present and others reporting none. Beef fat and beef muscle[13] have been reported to contain, respectively, 500 Sherman units and 15 Sherman units of vitamin A per 100 grm., while lard and pork have been reported to contain practically none. On the other hand, Sherman reports[9] bacon to contain 15 Sherman units of vitamin A per 100 grm. If bodily stores of vitamin A in the rat may be considered to be approximately parallel to that of other animal species, Sherman's work[14] shows that kidney and lung contain 40 times, and liver 200 to 400 times as much vitamin A as in skeleton muscle. This assumption may be supported by the fact that calf and hog liver have been found to contain, respectively, 7,300 and 8,000 Sherman units of vitamin A per 100 grm. Liver must be classed as a good source of vitamin A.

No appreciable losses of vitamin A take place during cooking operations, and during the processing of canned foods even less destruction may be expected, due to the partial or total exclusion of air.[15] Lunde,[16] working with fish which contain appreciable amounts of vitamin A, found no destruction of this vitamin due to smoking or canning operations.

Vitamin B_1

Vitamin B_1, or thiamin, is a water-soluble vitamin of value in correcting and preventing beriberi, regulating intestinal tone, regulating heart beat, stimulating appetite, and securing optimal growth in infants and children. More and more evidence is being obtained for the necessity of ample amounts of this vitamin in the diet. Many nutritionists have advocated the fortification of the public diet by the addition of pure synthetic vitamin B_1, or natural concentrates of this vitamin, to foods. The daily adult requirement is estimated to be approximately 300 to 600 International units.[17]

Vitamin B_1 shows considerable resistance to heat in an acid or slightly acid medium, while in an alkaline medium it is easily destroyed even at relatively low temperatures. Elvehjem, Hart and associates[18] showed that the vitamin B_1 in yeast and liver was completely destroyed by autoclaving, and that in liver it was inactivated by heating at 100° C. for 24 hours. The preservation of this nutritional factor presents an important problem to food manufacturers.

It has been shown that meat is an excellent source of vitamin B_1. In Table I are shown the vitamin B_1 contents of various meats and meat products. An examination of these results reveals that meat is a large contributor of this vitamin to the average human diet.

Effect of Heat on Vitamin B_1

Christensen and associates,[20] studying the effect of cooking and canning on meat, showed that lean pork cooked at a temperature not exceeding 90° C. lost 12 per cent. of its vitamin B_1 potency, while lean beef cooked in the same manner lost 20 per cent. Heating pork in a steam autoclave or pressure cooker for 70 minutes at 10 lb. pressure (240° F.) destroyed 21 per cent. of the vitamin B_1 in the case of the pork and almost all of the vitamin B_1 in the case of the beef. Elvehjem and Arnold,[21] studying canned dog foods, reported that a temperature of 250° F. for 110 minutes destroyed 80 per cent. of the original vitamin B_1. Using the same process, similar losses were observed upon canning pork muscle.[22] As the temperature and time of processing were decreased, the amount of destruction of vitamin B_1 was greatly diminished. It must be emphasised that for the size of can used, dog foods are given a more drastic process than other meat products. Japanese workers[23] report that the daily requirement of vitamin B_1 for normal growth in the rat was supplied by an alcoholic extract of 20 grm. of raw beef or 40 grm. of canned beef, thus indicating a 50 per cent. destruction. They also concluded that canned beef which had been stored for 4 to 5 years had not diminished in vitamin B_1 content. Lunde and Kringstad[24] working with cod roe reported a loss of only 20 per cent. due to canning operations.

More Research Needed

The chemical characteristics of meat are not the most suitable for the preservation of vitamin B_1 during heating. Meat has a *p*H of approximately 6·2 and requires high temperature, long period processes for its complete sterilisation when canned. As has been shown, the losses of vitamin B_1 caused by canning are variable for different meats and large in some cases. There is a great need for more specific information on the effect of cooking and canning operations on this vitamin when present in non-acid products such as meat. Nevertheless, many meat products, whether cooked or canned, still contain appreciable amounts of this vitamin.[25]

Vitamin B_2

In the vitamin B_2 complex, nicotinic acid and riboflavin stand out as the most important members of the group. Work by Elvehjem and co-workers[26] resulted in the isolation and identification of nicotinic acid as the anti-black tongue factor in dogs. Spies[27] and others[28] have also shown that this compound also prevents and cures human pellagra. Previous to this discovery, Goldberger, Sebrell, Wheeler, and others,[29-32] of the United States Public Health Service, had carried out an extensive survey on the occurrence of the anti-pellagra factor in foods. Among the foods which they listed as good sources of this factor are found: lean pork shoulder, rabbit meat, fresh beef, canned corned beef, canned chicken, and canned salmon. Lard and salt pork were classed as poor sources.

The nicotinic acid contents of various meats and meat products are shown in Table I. These figures confirm the findings of Aykroyd and Roscoe,[31] who in 1929 reported that ox liver rated excellent, and meat good, as sources of the anti-pellagra factor. The daily adult requirement of nicotinic acid is estimated to be approximately 10 to 25 mg.[17]

Nicotinic acid is considered to be relatively stable toward moist heat. There is little danger of losses of this nutritional factor during the processing of canned meats.[15]

Riboflavin is widely distributed in plant and animal life. The necessity of this factor for the promotion of growth in experimental animals has been demonstrated. Since there is evidence to indicate that derivatives of riboflavin have an important function in the respiratory system of animal cells as hydrogen acceptors, it seems obvious that this compound also bears an important relationship to human nutrition. It has been shown that the Sherman-Bourquin method for estimating vitamin G is an estimation of riboflavin,[35] and that one Sherman-Bourquin unit of vitamin G is equal to 2·0 to 2·5 micrograms of synthetic riboflavin. The adult requirement has been suggested as 1 to 2 mg. per day.[17]

Stability of Riboflavin

In regard to stability, riboflavin may be considered less stable than other members of the vitamin B_2 complex.[15] However, it is considered stable at temperatures employed in cooking and tanning. Heating in an alkaline media at these temperatures may cause appreciable losses. It is believed that the critical *p*H is about 8·0 to 8·5, which is above that normally found in canned meats.

Table I also shows the riboflavin contents of various meats and meat products. In comparison with other foods, meat may be classed as a good source of this component, while liver must be considered as one of the richest sources.

Carlson and Sherman[37] showed that in rat tissues heart muscle was five times as high in riboflavin as skeleton muscle, kidney ten times as high, and liver ten to twenty times as high. Day[38] concluded that beef heart contained three times as much vitamin G (riboflavin) as muscle, while liver and kidney contained eight to ten times as much. Gyorgy[39] and Day[38] found veal round steak to be slightly superior to beef in riboflavin content.

Hoagland and Snider[10] reported that beef, pork, and lamb appeared to contain approximately the same quantities of vitamin G (riboflavin), and that beef spleen contained about as much as beef.

Studies by Christensen and associates[20] showed that no losses of vitamin G (riboflavin) occurred during the cooking or autoclaving of pork and beef. It is safe to conclude that no losses of riboflavin take place during the sterilisation of canned meats by heat.

Vitamin C

Ordinary meat is not considered a source of vitamin C, the anti-scorbutic vitamin. There are, however, small amounts of vitamin C in muscle and appreciable amounts in kidney and liver.[13] Due to the fact that fruits and vegetables are considered the most important anti-scorbutic foods, little attention has been given to the effect of cooking and canning operations on the comparatively small amounts of vitamin C in meat products.

Vitamin D

Vitamin D, the anti-rachitic vitamin, is lacking in muscle but present in significant amounts in liver.[13] It is very heat stable and is not destroyed by cooking or canning operations.

TABLE I.

VITAMIN CONTENT OF MEAT AND MEAT PRODUCTS

	Vitamin B_1.[24] *International Units Per Gram. (Dry Basis).*	Nicotinic Acid.[38] *Milligrams Per Gram (Dry Basis).*	Riboflavin.[18, 41] *Sherman-Bouquin Units Per Gram. (Fresh Basis)*
Beef brisket ...	—	—	0·74
Beef heart ...	10	—	—
Beef kidney ...	5	—	—
Beef liver ...	4	—	10·0
Beef round ...	3	0·4	1·0
Beef spleen ...	2·5	—	—
Beef tongue ...	3	—	—
Lamb chops ...	—	—	1·1
Lamb liver ...	4	1·33	—
Lamb leg ...	4	—	—
Veal hind-quarter ...	4·5	0·4	—
Veal liver ...	1·7	0·8	—
Pork ham ...	11-20	0·6	1·2
Ham cured ...	—	—	0·81
Smoked ham ...	11	—	—
Pork loin ...	13-20		
Pork heart ...	8	0·7	—
Pork liver ...	5·3	0·8	9·2
Pork kidney ...	8	1·0	—
Bacon ...	—	—	0·36

Vitamin E

The relation of vitamin E, the anti-sterility vitamin, to humans has not been definitely established. The average human diet is considered to contain ample amounts of this vitamin.[13] Vitamin E is stable to heat, readily destroyed by oxidation, and reported to be unstable in the presence of certain fats.[11] Animal tissues contain small amounts of this vitamin, although in the main it is concentrated in the fat portions. No particular attention has been given to this vitamin in canned meats.

Besides the nutritional factors of meat which have been discussed, there are other constituents which may be shown by further scientific research to be very valuable. Chondroitin, which is abundant in cords, cartilage, and connective tissues, has been shown by Crandall and his associates[12] to have an important beneficial effect in the treatment of human stomach ulcers. Other members of the vitamin B_2 complex, such as the chick anti-dermatitis factor, the rat anti-dermatitis factor (vitamin B), and factor W (the growth factor in liver), must not be overlooked.

Conclusions

The nutritional value of meats varies with the animal and the portion of the carcass. In general, meats have been shown to be good sources of protein, fats, minerals, and energy, all of which are practically unchanged by the temperatures employed in sterilising the canned product. Meats are considered good sources of vitamin B_1, nicotinic acid, and riboflavin. Some meats and meat products contain appreciable quantities of vitamins A, C, D, and small quantities of vitamin E. In general, it has been shown that the temperatures used for sterilisation of meats properly canned cause partial destruction

of vitamin B_1 and no appreciable, if any, losses of vitamin A, riboflavin, nicotinic acid, or vitamin D. The nutritional value of canned meats may be regarded to be similar to that of home-cooked fresh meats.

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Society of Chemical Industry

EXETER was the scene of a brilliant gathering of chemists from July 10-15, on the occasion of the fifty-eighth Annual Meeting of the Society. A very full scientific and social programme was carried out, which included the Presidential Address by Mr. Victor G. Bartram and the presentation of the Society's medal to Sir Gilbert Morgan at the conclusion of his address, in which he gave an interesting account of his life's work.

The Symposium "The Trend of Progress" included papers on "Cellulose", by Dr. Julius Grant, M.Sc., F.I.C., and Dr. H. A. Thomas, B.Sc., A.I.C.; on "Cosmetics", by H. S. Redgrove, B.Sc., F.I.C.; on "Oils, Fats (other than edible) and Detergents", by P. W. Tainsh; "Insecticides", by Dr. J. T. Martin, B.Sc., A.I.C., and Dr. F. Tattersfield, F.I.C.; "Fungicides", by Dr. Hubert Martin, A.R.C.S., F.I.C.; and "Agricultural Science", by Sir E. John Russell, O.B.E., D.Sc., F.R.S.

The social activities were many and varied. At the Annual Dinner the Rt. Hon. R. B. Bennett, ex-Prime Minister of Canada, replied to the toast of "The Guests", proposed by Professor J. C. Philip, and speeches were made by Sir Frank Fletcher (former headmaster of Charterhouse), Mr. Bartram, Mr. R. Glave Saunders, the Mayor of Exeter, and Dr. John Murray, Principal of the University College of the South-West.

On Tuesday afternoon in the beautiful grounds of Reed Hall a garden party was given by invitation of Lord and Lady Leverhulme.

Numerous visits were made to factories and works, including a whole-day trip on Friday to Dartington Hall, where delegates were able to see the many angles of the work done there.

The meeting closed on Saturday evening after a whole-day tour of North Devon.

Cativic Acid Salts for Chewing Gum

CATIVO resin, the sticky, greenish-brown exudate from the species of tree known as Prioria Copaifera Gris growing in the tropical lowlands of Panama and Costa Rica, is composed to the extent of 70 to 75 per cent. of an acidic substance to which its discoverer, the American chemist N. L. Kalman, has given the name of cativic acid. A monobasic acid with one ethylene bond and the probable empirical formula $C_{20}H_{32}O_2$ (its structure has not been definitely elucidated), pure cativic acid is a colourless and odourless semi-solid readily forming esters and salts. It can be isolated from crude cativo resin by distillation in a high vacuum at above 200° C., a small percentage of water and volatile oil coming over at a lower temperature while the residue in the still is mainly cativyl cativate.

Of interest from the edible standpoint are the calcium and magnesium salts which are non-poisonous and recommended as chewing gum bases when mixed with a water-insoluble modifier such as oleyl alcohol. Compositions of this type are notable for great coherence and extensibility. Like all salts of cativic acid with the exception of those of the alkali metals, calcium and magnesium cativates are insoluble in water and readily prepared by adding an aqueous solution of a metallic cativate (*e.g.*, magnesium sulphate) to a solution of sodium cativate.

Book Reviews

MICROBES FOR THE LAYMAN — VITAMINS FOR THE EXPERT

Microbes by the Million, *Hugh Nicol. 247 pp. Penguin Books. 6d. net.*

It is a trifle difficult for a bacteriologist to put himself in the place of the lay reader, and to prepare for the writing of these notes I consulted three or four people to whom bacteriology was hitherto a closed book. Their verdict was unanimously favourable and, be it added, they were subjected to a stern and mildly sceptical questioning to prove that they had not only read Dr. Nicol's book but had also marked, learned and inwardly digested it.

The mere fact that we have had to wait so long for a really "popular" book on bacteriology would suggest the magnitude of the task of its writing, which has doubtless affrighted many potential authors. Dr. Nicol has avoided one temptation to which a more spectacular writer, mindful of his public, might have well succumbed—to "daub his microbes with the smoke of hell"—and he has mainly left the pathogenic organisms to look after themselves.

The actual descriptions and explanations of micro-organisms have been well and clearly done, so well done, in fact, that one can leave it at that.

As the book proceeds, Dr. Nicol, leading us along the tortuous paths of the subject, injects in a somewhat schoolmasterish manner odds and ends of miscellaneous information—*lichens* are pronounced *ly-kens* and so on. We are sometimes suddenly transported from the atmosphere of the classroom (this classroom business only crops up here and there) almost to the realms of metaphysics. The section on viruses ends like this: "I suggest then that virus is like an abstract border-line made visible, it is itself the border. To show you a tube of virus in crystal form is like bringing you a glass of real water from Charon's Styx, which you have been brought up to believe is entirely a mythical river." But Dr. Nicol doesn't often succumb to such temptations, and, after all, some latitude may be allowed to a writer who gives such a clever one-page comment on a subject like the viruses.

Incidentally, there is a neatly combined discursiveness with compression throughout the book, which adds to, rather than detracts from, the lay reader's interest.

The said reader may at times become a little submerged by the unavoidable scientific nomenclature, and just when he is probably gasping a little he finds himself on the surface breathing the revivifying oxygen of the author's whimsicality. Even the quotations from *Alice in Wonderland*, which head the chapters, deftly culled as they have been, carry him along quite pleasantly.

Dr. Nicol writes some quite pungent stuff about physical fitness, although, just because there is not at present (and will probably not be for a long time yet) any experimentally ascertainable standard of health, as he says, there seems no reason to call into doubt that properly fed people must be more resistant to disease than those who suffer from malnutrition, bad living conditions and overwork. Some very eminent doctor once said that disease could not attack a healthy organ. What exactly he meant by this might seem a little obscure to the simple man, as it might appear as if microbes could only attack an organ which had already been attacked by other microbes. And this looks something like the old problem of the hen and the egg.

To return to Dr. Nicol's thesis, he deplores the lack of a unit of resistance and the neglect of the medical profession to enquire scientifically into what constitutes and maintains ordinary good health. No less a personage than Sir E. Kaye Le Fleming, speaking recently at Rothamsted, expressed broadly the same opinion. Let us continue to urge the finding of a unit for measuring that rather nebulous entity—health. But even then, it will not solve the main problem any more than the discovery of the causative micro-organism of (say) tuberculosis has helped much to effect a cure.

Dr. Nicol writes about the public's fear of microbes, which he doesn't altogether share. He traces this fear to the early days of microbiology and draws an amusing analogy from the persistence of the public in addressing their letters London, N.E., the postal district "N.E." having been officially abolished in 1869. The present reviewer does not share the author's disdain of microbes, and his dislike of them was not weakened by the recent exhibition of terrifying charts by a learned bacteriologist at Cambridge, which demonstrated the spread of streptococcal infections in the throat.

Dr. Nicol is, one almost writes the word surprisingly, among the opponents of the pasteurisation of milk. He trots out some of the old familiar arguments such as that pasteurisation "is a boon to wholesalers because it enables them to handle originally dirty milk".

It is generally admitted that a perfectly healthy cow population is devoutly to be wished as a means of producing healthy milk (although not in preventing subsequent contamination), but in the meantime what is to be done? And does Dr. Nicol fly in the face of the results of numerous researches which tend to show that the nutritive properties of milk are not materially affected by pasteurisation?

Usually Dr. Nicol treads warily in his pages. He seems to have his eye cocked nearly all the time on the specialist, but in his "Envoi" he comes out into the open and talks to him. In his Epilogue he is at his sprightliest. As he suggests, his remarks about examiners will make them laugh wryly. He trails his coat valiantly in this chapter, although he has mainly secured himself with a carefully prepared barrage of references. He says that in music and art opinion is all that matters. Elsewhere he is inclined to suspect the value of any person's opinion except about matters on which no experimental test has been or can be made on modern lines. I wonder why.

Social problems, ratios, 'bus companies' dividends and the sophistry of hard-headed businessmen are all discussed.

In his excellent book Dr. Nicol has practically demonstrated one of his *obiter dicta*—that "science could be enormously human".

T. C.-W.

Vitamins and Vitamin Deficiencies, *Leslie Harris, Ph.D., Sc.D.(Cantab.), D.Sc.(Manc.), F.I.C. Volume I. Historical and Introductory; Vitamin B_1 and Beri-beri. xiv+204 pp., figs. 50. 8s. 6d. net.*

This first volume of *Vitamins and Vitamin Deficiencies* is really what it claims to be, "a comprehensive but concise review of modern knowledge about vitamins". It is the first of seven volumes and deals shortly with the historical aspect of the subject and more fully with vitamin B_1 and beri-beri. Future volumes are to deal with (2) Vitamin C and Scurvy, (3) Vitamin D and Rickets, (4) Vitamins A and E, (5) Pellagra and Vitamin B_2(G) Complex, (5) Other Vitamins and Unclassified Factors, and (7) Applications and Dietetics.

The author has most conscientiously tackled the subject of "priority" in the discovery of particular vitamins, not an easy task, since it involved the consultation of writings from various European countries, the United States of America and even Japan. In fact, the historical study of vitamins must be a most difficult one, for the existence of each factor was recognised by its effect on the animal body and its presence or absence detected in a foodstuff by the same means long before it was isolated and recognised as a definite chemical compound. No wonder was it, then, that what was at first thought to be one vitamin has since proved to be two

or even more. The isolation of each vitamin was hindered by the fact that it occurred in very minute quantities even in the substances regarded as rich in the factor. It may be reckoned as a measure of the progress made in our knowledge of the vitamins that one manufacturer is at present reported as synthesising a hundred kilos per month of one vitamin alone. The list of accessory factors claimed to have been discovered, though not isolated, by various workers grows longer year by year.

The rest of the book, which is indeed the greater part of it, deals with vitamin B_1, the antineuretic vitamin, a substance which has been separated from various foodstuffs, purified, analysed and synthesised by at least three different methods. Experiments are made with it on various living animals, the rat, mouse, pigeon, dog, etc., and on human beings. It has been possible to determine the amount of vitamin B_1 needed daily by a human being by measuring chemically the output in the urine after dosage. The amount required depends on the metabolism and therefore upon the weight of the subject and the amount of work done. An increased need during pregnancy and lactation is now generally recognised. Its use in clinical work is being greatly extended, since its preparation in pure form made it really worthy of clinical trials. As with other vitamins, so with vitamin B_1 is it realised that the daily intake required for really robust health is probably many times the intake required to prevent obvious signs of avitaminosis. Work on the physiological action of vitamin B_1 has made great progress also, and it is now generally accepted that vitamin B_1 as the pyrophosphate acts as a co-carboxylase in the breakdown of carbohydrates in the animal body. The assay of vitamin B_1 in food substances has been courageously attempted, but as biological assays involve an estimate of the accuracy of such tests, the subject is really too large to be dealt with in a volume of this size.

The book is well printed and bound and the illustrations and diagrams are very well reproduced. Author and publishers are to be congratulated on the production of an exceedingly useful work and the remaining volume will be eagerly awaited.

K. H. C.

Margarine Made in Holy Land

First manufacture of margarine in Palestine has just begun at the factory of Palestine Edible Products, Ltd., Haifa. The firm was founded by Distributors and Transporters, Ltd., of London, in conjunction with Shemen (Oil), Ltd., of Haifa. From Messrs. Van den Burgh of London has been acquired the right to market the new margarine under the well-known trade mark "Blueband". Other brands will bear the names "Dekel" (Palm) and "Lotus".

Dr. Hildesheimer, managing director of the new company, told Press representatives that when he came to Palestine five years ago there was no demand for margarine, but by 1937 he was importing 200 tons. This impelled him to start production in Palestine, especially since the main raw material—edible oil—was being manufactured at Haifa by the Shemen Oil Company.

Refined oils are pumped from the Shemen works directly into the adjoining margarine factory, where they are blended with prepared fats, which are churned and passed on to the cooling tubs for solidification, followed by the usual plasticising, weighing, and packing. Entirely modern machinery and hygienic methods are used throughout, the substance never being touched by hand. Manufacture is according to Dr. Hildesheimer's Palestine Patents and conforms with the results of latest scientific research.

Able to produce 600 tons of margarine yearly, Edible Products, Ltd., aim to introduce the food to the whole of the Near and Middle East. It is expected, too, that not only margarine imports into Palestine will be eliminated, but also butter, the price of the best margarine being half the price of the cheapest imported butter.

"Blueband" and "Dekel" brands of this Palestine product are vitaminised with vitamins A and D.

The Relation of Carbon Dioxide Gas to the Keeping Quality of Butter

The problem of preserving the freshness of butter is one that has long confronted the creamery industry. As improvements are introduced in the manufacture of butter and the quality of fresh butter is improved, the problem of holding butter from the point of making to the time it may reach the consumer becomes more acute. The finer the quality of butter the more difficult it becomes to maintain the fineness of the product. One of the chief problems confronting the industry is the occurrence of stale and slightly oxidised flavours on the surface of high-quality butter. Much work is being conducted in this country and abroad in attempts to learn methods of preserving the surface flavour of fine- or high-quality butter. From work conducted at the University of Illinois a number of years ago, it is suggested that the surface flavour of butter might be preserved if it were stored in an atmosphere of carbon dioxide. The practical application of this suggestion is being studied at present by members of the Dairy Division of the University of Minnesota.

The experimental work under way at Minnesota might briefly be outlined as follows: Butter of high grade, 93 score sweet cream butter, was selected for the study. The butter was wrapped in ¼-lb. prints, since it is known that this size package is difficult to store without the occurrence of surface flavours or that it is at least more susceptible to oxidation. Lots of butter from different churnings were placed in cold chambers at 40° F. and containing various concentrations of carbon dioxide. A check lot of the butters was placed in a chamber maintained at the same temperature as the above but in the atmosphere. For the first two months of the trial the butter was held at zero degrees F. It is expected that at the end of this period the butters will be held for a period of sixty days at 40° F. Bacterial, mould and yeast analyses, together with regular organoleptic examinations of the surface of the butter, are being made on the butter.

Information will be available as to the percentage of the gas concentrations and temperatures producing the greatest beneficial results. Favourable results will require further studies for commercial applications. The importance of such a project is well appreciated by those confronted with the problems of storing butter.

Quality Control for Sugar

The white sugars, which include beet and cane, are perhaps the nearest approach to chemically pure substances included in the daily diet. They are the most important of the energy-giving foods, supplying more calories per unit cost than most other food products. Their universal use in food products dictates that the highest quality sugar obtainable shall be used in order that the desired quality of the finished food product be obtained.

Much stress is placed on the production of high-quality sugar by the industry and large amounts of money are spent annually to improve and control sugar quality. New and more effective machinery for processing, new packaging and storage methods have been developed to aid in quality control.

The presence of thermophilic food spoilage bacteria in sugar has been the cause of much concern by the canning industry. Their significance in non-acid canned foods has been determined, resulting in the adoption of standards by the National Canners' Association for canning-grade sugar. Special attention is, therefore, given to the elimination of these organisms from sugar during its manufacture. Consideration is also given to the control of mesophilic bacteria, yeasts and moulds, because of their significance in the dairy, beverage, confection and baking industry.

The discovery within the sugar factory of places vulnerable to the invasion and subsequent development of bacteria has

(*Continued on page 282*)

CHICKENS

E. F. ARMSTRONG, D.Sc., F.R.S.

MOST of us, even the most inveterate town dwellers, have kept chickens at some period of our lives, or at least lived somewhere where they are raised. We are aware of the changes, which to the chicken must appear drastic, whereby they are no longer allowed to roam at will, picking up such scraps as they can, but are confined in enclosed spaces and are supplied with regular meals, due attention being given to the balance of the ingredients thereof, including a proper proportion of the requisite vitamins.

A Protein Producer

In fact, in the cold inhuman language of science, the hen is coming to be regarded as a protein producer, and an efficient one at that, living on a diet of cod liver oil, grains, and animal by-products. The chicken, as we know, produces protein daily in the form of eggs and of chicken meat, both of which play so large a part in supplying protein food, which is the most expensive of the three types of nourishment—sugar, fat, protein—required by the body.

We are not here concerned with eggs, or their production, but rather with the chicken regarded as a table bird. Chicken is no longer just chicken; the raising of dressed poultry has become a scientific industry both in this country and more particularly in America, where 800,000,000 pounds—it looks more in figures—are consumed annually.

Pedigree Tells

The first thing is obviously to have good stock, the second to raise the chickens with due avoidance of the many diseases. An immense amount of technical information on these and kindred matters is available for the taking, and chicken farmers should have no excuse for failure through ignorance.

At the next stage the packer steps in; as the result of scientific thought, attention is given to every stage of the ensuing processes. Slaughtering must be done in a proper manner, so as to ensure maximum bleeding and feather muscle relaxation; a machine will do this so much better and more uniformly than man. The plucking is done by holding the birds for a few seconds in water at 126° to 130° F., after which they are roughly plucked, removing three-quarters of the feathers. Next the birds are dried and plunged into a molten wax mixture so as to acquire a coating. When this coating has cooled and hardened it can be pulled off in large pieces that carry off with them the remaining feathers. The wax is remelted, strained, and used again.

This process has been a long time in the making; it has only recently become entirely successful.

The chicken is now ready to be packed and chilled for delivery to the retailer. In America all fresh food is chilled at the factory and both transported and kept in this state in the shops until it is acquired.

"Ready to Cook" Chickens

The modern demand is for "ready-to-cook" chickens, which must be eviscerated at the factory: this process increases the risk of bacterial spoilage, and has to take place at the proper time and under conditions of extreme cleanliness. Picked birds are usually selected, which are individually wrapped and quick-frozen. Alternatively, they can be jointed and pass through the processes appropriate to canning.

As five and twenty per cent. of the weight of the bird is lost in drawing, the price per pound charged for such birds must be larger, an item which the customer does not always understand.

We have chosen this particular subject in order to illustrate a tendency in food production which is only gradually being realised.

Hand in hand with the desire to produce a quality product which is regular and dependable is the need to make such production a definite industry subject as little as possible to the vagaries of individual farmers, the variations of the seasons, or the fluctuations of local markets.

The production of milk is an example. Cows giving high yields of high quality milk are selected; they are scientifically fed under hygienic conditions, the milk is bulked and supplied in a cleanly form.

Dependable Milk

The production of meat, both beef and mutton, is undergoing a similar transformation. The industry wants regularising. Greater use will be made of refrigeration in the future; probably the carcasses will be jointed at central points, so that it will be possible to buy frozen cutlets or a steak of guaranteed quality, wrapped in Cellophane, instead of being content with what the butcher sends us. All this is already done across the Atlantic. The meat costs a little more, perhaps, but it saves trouble in the house, which means much in these days when domestic help is scarce and house-keeping unattractive to the modern girl.

All these are protein foods, the protein being synthesised by an animal largely from carbohydrate grain or grass. Another living agency which effects protein

synthesis from sugar or grain is yeast, and calculations have been made of the relative cost of protein by the several means. It may well be that some day we shall eat yeast protein more extensively.

Scientific farming also applies to fruits. Many of these are canned in ever-increasing quantities in addition to being sold fresh, and there is no waste on the orchards. A new development is the marketing of fruit juices. Perhaps before long we shall no longer have fruit wasting in the orchards of Kent, because a good crop has made it uneconomical to pick at the prevailing prices. All the unsold crop can be turned into apple juice, preserved for sale during the ensuing months, so giving much-needed vitamins, salts, and nutrients to the users. It only wants organising; the latent powers of the Englishman to organise for himself must be developed again; to-day he largely waits for the Government to do something and then criticises it as not enough or quite wrong! A hundred years ago the offer of a gold medal by the Society of Arts was enough to stimulate enterprise: perhaps we must do it again.

It is clear that much quality food can be produced on a scientific industrial basis and stored all the year round by methods which will make it largely independent of the vagaries which beset the present production: hence it will be sold at regular prices with a consequent profit to the undertakers. Such must be the new farming.

From the Journal of the Royal Society of Arts.

The Conserve Industry in Czechoslovakia

ALTHOUGH the conserve industry is relatively undeveloped in Central Europe, Czechoslovakia has all the primary requisites for various branches of the food-preserving trade. There is an abundance of fruit and vegetables and country produce generally, while sugar and vinegar are made in large quantities.

Bottled and Canned Foods

There is, however, still some prejudice against bottled and canned foodstuffs, in consequence of which the sale of these goods is below that which the population could absorb. Imported goods, too, are sold at rather high prices, beyond the reach of the vast masses of the population.

A Hundred Firms

Nevertheless, the industry comprises about a hundred firms, specialising in conserves of some kind. Most are equipped with up-to-date plant, and the products are of good quality. For a number of reasons they are not likely to enter the British market, whereas British conserves, though dear, are thought much of in Czechoslovakia.

Home-Grown Sugar

The fruit-conserving factories use local beet sugar and such fruits as apricots, apples, pears, strawberries, gooseberries, cherries, and raspberries, to make jams and marmalades. In particular there is a special thick, firm jam made from blue plums, much favoured in Central Europe. The industry also bottles fruits boiled in their own or sweetened syrups, as well as candied fruits. A by-product is fruit juice, much of which is exported for making soft drinks. Raspberry essence, in particular, finds a ready market for both alcoholic and non-alcoholic beverages, either natural or sweetened.

Vegetable Products

The vegetable conserve section of the industry comprises three groups. To the first belong products such as canned asparagus, peas, beans, carrots, spinach, and tomatoes. No less than a hundred tons of tomato *purée* are exported annually. The second group includes vegetables pickled in vinegar or salt; cucumbers and sauerkraut are the main products in this branch. Lastly, there are the dried vegetables, including peas, beans, carrots, parsley, and also dried mushrooms, which are much favoured in soups and omelettes. Altogether some 130 tons of dried vegetables leave Czechoslovakia each year.

Cooling Cupboard for Dipped Chocolates

AN interesting cooler for dipped chocolate articles which permits a considerable saving of space over the usual cooling tunnel has been brought out in Germany. The whole machine is contained in a case in plywood with wood framing, this material providing a suitable heat-proofing and preventing too much loss of cold during the cooling process.

Chocolates are brought into the machine from the dipping machine on pieces of cloth which are carried along into the cooler by a moving belt. As the edge of this piece of cloth enters the cooler a pair of clamps seize it automatically by the corners and draw it back into the machine, where it rests on a plate made up of strips of silumin, an aluminium alloy.

A series of these plates is supported by chains which run up the sides of the case containing the machine. These chains are provided with discontinuous movement, moving to lift the pile of plates just enough so that as soon as one has been filled with a chocolate-bearing piece of cloth, the one below is raised up to the level of the belt feeding the machine, ready to receive chocolates.

When the plate reaches the top of the case it is drawn horizontally along guide rails on to a second set of chains, which move it down, from the top towards the bottom of the case. Here it is again moved to a third set of chains, which carry it back upwards, and finally to a fourth set, which take it down until it reaches the level of the discharge opening of the machine. The machine might, therefore, be described as four piles of plates, one next the other, moving alternately up and down, and carrying the cloths covered with dipped chocolates.

When the plate reaches the level of the discharge slit a pair of clamps again seize the cloth and pull it off of the plate on to a discharge belt transporter of sufficient length to permit the chocolates to be removed. To facilitate this, the clamps which draw the cloth from the cooler pull it under a knife which pulls the chocolates free from the cloth.

Cooling is obtained by running a constant current of chilled air through the machine. Space for the installation of the necessary refrigerating unit is provided in a projection at the top of one end of the case, the cooling coils running from this to the various sections of the machine's air circuits.

Three circuits are provided, a pre-cooler, including the first pile of plates, a main cooler, including the second and third piles, and a supplementary cooler, including the fourth. The air circulation is obtained by forcing the air into the space between the pile of plates and the outer casing wall on one side, and allowing it to pass over the chocolates resting on the cloths on the plates, evacuating the air through a duct leading from the space between the plates and the case wall on the opposite side.

The standard length of the machine is 4·6 metres, but the height varies according to the length of time which is to be allowed for cooling.

WAGES DURING ILLNESS

Of interest to employers is this discussion by a Barrister-at-Law on the present state of the law as it affects minors.

One consequence of the decision of the Court of Appeal in Marrison *v.* Bell to the effect that an employer is liable in law to pay an employee full wages during illness without any deduction for sickness benefits has been that employers have sought to limit their liability in this respect by express agreement with their employees.

Many employees, however, are minors in the eyes of the law, by reason of being under 21 years of age, and the question that has exercised the minds of employers is as to whether such an agreement may be validly entered into with a minor.

A minor may, of course, enter into such an agreement with his employer, and the only way in which the latter may thereby be penalised is by the minor subsequently repudiating the agreement and refusing to be bound by his promise. How will the law view such an agreement?

There is no definite decision on the point, but from previous authorities one may make a shrewd guess of what the attitude of a court of law would be if a minor sought to repudiate such a promise.

For this purpose one must consider the legal principles which govern an infant's contracts. They fall into three groups roughly. In the first group come contracts which are absolutely *void*—viz., contracts for loans and goods (other than necessaries). In the second group come contracts which are *voidable* by the infant. In the third group come contracts which are *valid and binding* on the infant. Only two kinds of contracts enjoy this privileged status—viz., contracts for necessaries and contracts for the benefit of the infant.

Now a contract of employment is, generally speaking, for the benefit of the infant, since it provides him with a living and trains him at the same time. It is not every such contract which is necessarily valid. All its terms must be considered. If on a consideration of its terms as a whole it is beneficial, it will be valid and binding. And the presence of one or more disadvantageous term or terms in the contract will not necessarily have the effect of making it a contract which is not for the benefit of the infant. It is a matter of degree; but, generally speaking, a clause limiting the employer's ordinary liability for the payment of wages, during illness, will not render the contract invalid. And if the contract as a whole is beneficial, and therefore binding, every term of the contract, including the clause limiting liability, will be valid.

It may be useful for this purpose to refer to the case of Clements *v.* L. and N.W. Railway Company. In that case an infant was employed by a railway company, and as part of his contract of service he agreed to become a member of an insurance society and to be bound by its rules. This society was formed among the employees of the company and the company contributed to its funds.

By the rules of the society he was to receive contributions and other advantages and in return he was not to make any claims for compensation under the Employers' Liability Act, 1870, against his employers.

The rules covered all accidents, with certain exceptions, including accidents for which the employees were not liable. The contribution payable under the rules of the society was, however, less than the compensation which was recoverable under the Employers' Liability Act.

The Court of Appeal held that the agreement to become a member and to be bound by the rules of the insurance society was a part of the contract of service into which it was competent for the infant to enter, and that the contract as a whole was beneficial to the infant and all its terms accordingly were binding on him.

Assuming, therefore, that an agreement limiting the right of the employee to receive wages during illness may be validly entered into by an infant, there is one further safeguard which an employer may adopt.

It would be wiser for him to terminate any existing contract with infant employees, and then to re-engage them under a fresh contract of service. The new contract would, of course, contain a provision limiting the right of the employee to receive wages during illness to the extent desired.

Foods at the Swiss Exhibition

Banago is the name of a new tonic drink shown in the Food Pavilion of the Swiss National Exhibition, which is being held at Zurich until the beginning of November. Made by Nago, of Olten, Switzerland, it is composed of leguminous vegetables, banana, sugar, fruits, phosphates and calcium salts, rendered digestible by a special fermentation process.

It is advertised as particularly suitable for children and old people, and is prepared with one to two spoonfuls for a cup of boiling milk. Sugar is added to taste.

Nagomaltor, made by the same firm, is a concentrate made with full milk, eggs, cocoa, honey and nutritive salts.

Conserved cucumbers are being displayed in the pavilion by the *Conserven-Fabrik Company*, of Bischopfszell.

Considerable space is being given to all forms of food manufacture at the Exhibition, and teams of artists have been enlisted in order to give the utmost publicity value to the native products by means of paintings, photographs and attractive arrangement of exhibits.

Congratulations to Mr. Keith Fraser

On June 27, at Suffolk House, Marsh Lane, Stanmore, to Marjorie, wife of Keith Fraser, Manager of the Leonard Hill Publications, a son.

Quality Control for Sugar

(*Continued from page 270*)

been accomplished. It has been determined that quality control lies almost solely in the proper use of mechanical equipment supplemented by the application of the usual sanitary measures applicable in the food industry. Much of the reliance formerly placed on the judgment of operators has been supplanted with automatically operated machinery. The application of numerous other corrective measures and practices has given rise to the improvement of the bacteriological quality of sugar. Advantage has also been taken of the location of bacteria and other impurities with respect to the crystal surfaces to aid in their more complete elimination and control. Packaging in containers impervious to the invasion of micro-organisms, dirt and moisture is advantageous, as is also the now almost universal practice of air-conditioning sugar warehouses. The result has been a more widespread use of white sugar with less tendency for some food industries to demand speciality sugars. The present quality of sugar is such that there is nothing to be desired in one type over another when manufactured for the same purpose.

(*Abstract of Paper read by Mr. H. H. Hall at the Second Food Technology Conference at the Massachusetts Institute of Technology, June*, 1939.)

NEWS FROM THE INDUSTRY

PLANT AND EQUIPMENT

Container Design

A 50 per cent. rise in the sales of one of his products after the container had been redesigned has encouraged a manufacturer to redesign another of his packs.

A few months ago Stevens Bakeries, Ltd., asked "Metal Box" to redesign the carton for their Trifle Sponge Cakes. By printing a continuous colour photograph on the sides of the carton, a complete picture for display purposes is made possible with four cartons.

This has proved so successful that "Metal Box" have now produced a similar carton for Stevens Battenburg Square Cakes and have again used the medium of colour photograpy. In this case the design on the four sides is devoted to making two complete pictures instead of one, so that an effective display may be achieved by placing two cartons together.

* * *

Electric Motors

A simple calculation will show that in the life of the average motor the cost of the electric current used during its working hours greatly exceeds the original cost of the machine. A slight improvement, therefore, in the efficiency or power factor may easily recoup in a year or two the extra cost of a more expensive machine.

Ransomes, Sims and Jefferies, Ltd., have just issued a new catalogue showing their electric motors for industrial purposes, and claim that their machines are designed with the before-mentioned factors in mind.

* * *

Fans for Corrosive Gases

We have received leaflet No. 262 (superseding No. 229), which has just been issued dealing with Kestner Keebush Fans. These fans are constructed on similar principles to the Kestner lead contact fans, but the fan casings are made entirely in Keebush acid-resisting material, and the impellers are constructed in solid Keebush.

The fans can be used for gases such as hydrochloric acid, which will quickly corrode and destroy ordinary cast-iron, steel, or lead-lined impellers, while the light weight enables a Kestner Keebush fan to be made far smaller and to absorb less power than earthenware fans for similar duties.

Dust Collection and Separation

Constituting a valuable contribution to the subject of dust collection and separation, a very handsomely produced booklet describing the Buell "Micro-Lector" dust separator has just been published by the Buell Combustion Co., Ltd.

Almost every industry is confronted with the problem of dust removal to prevent atmospheric pollution or for the salvage of valuable constituents of processing operations.

The booklet describes flue gas treatment, process dust recovery, dust separators of various types, such as the cyclone type or the compound type, which consists of a primary concentrator and a secondary collector, each designed to serve its special purpose.

Other interesting points in connection with the dust separating plant is the provision of an appropriately designed dust discharge system from the bottom of the collector, and special air lock devices have been developed for use with the Buell "Micro-Lector".

Copious illustrations are included showing the installations in such widely different industries as gold mines and tea factories, sewage disposal works, etc.

* * *

Lubricating Systems

Of interest to the food industry will be the array of automatic lubricating systems, including the "Brentford" and "Radial" Mechanical pumps, designed for application to all classes of plant and machinery whether in the light or heavy duty class, to be shown at the Engineering and Marine Exhibition at Olympia from September 14-30, by Tecalemit, Ltd.

These mechanical devices are available for use with either grease or oil and, broadly speaking, consist of self-contained pumping mechanisms adaptable to direct or various other forms of drive, and their application enables the machine concerned literally to lubricate itself without any manual attention other than a periodical replenishment of the oil or grease container.

Prominent amongst this group will be the "Multi-point" Lubrication Battery designed for continuous grease lubrication of heavy duty machinery such as Rolling Mills, Stone Crushers, Pulverisors, etc.

A New Power in Publicity

The Neon electrical sign for the display of advertising in prominent sites in towns up and down the country has been in vogue now for a number of years. There has recently been developed an electrical moving Neon sign for the display of advertised goods in stores, either on counter or in window, marketed by Neon Luminations, Ltd.

Points of interest are that, owing to the extreme intensity of light and the clear-cut lettering possible, messages may be read at a very great distance, and also renders the sign visible in a shop window by day as well as by night. Care has been taken to ensure that there is a complete absence of heat, thereby rendering them suitable for the display of even perishable goods.

* * *

A Valuable Alloy

Monel, an alloy containing approximately two-thirds nickel and one-third copper, is to-day playing an important part for a wide variety of applications in engineering and industry.

The alloy was first produced in 1905. Since that year Monel has rapidly developed, and to-day is used for a host of applications because of its strength at high temperatures and its resistance to abrasion and corrosion. Not only has it proved of value for both land and marine power plants, but it has been found of especial benefit in the chemical and process industries, and for food handling equipment it is very widely used.

Henry Wiggin and Co., Ltd., the producers of Monel in this country, have published recently a 30 page booklet on this alloy, entitled "Monel—An Account of its Properties, Principal Uses, Fabrication and Available Forms". Profusely illustrated, this publication contains much valuable information, and copies are obtainable free on application.

* * *

Change of Address

The address of the Standardization Branch of the Ministry of Agriculture and Fisheries is now Eagle House, 90, Cannon Street, London, E.C. 4. Telephone: Avenue 5061.

PLANT AND EQUIPMENT

Mobile Fire Pumps

A new portable petrol engine driven pumping unit, but which may also be used for other purposes where a portable self-contained pump set is required, has been put on the market by Worthington-Simpson, Ltd., of Newark-on-Trent.

The engine is manufactured by the Ford Motor Co., Ltd., and in connection with the A.R.P. arrangements now being made by many large firms, the mobile fire pump, which is simple to operate and control, should prove particularly useful.

* * *

Dial-Type Thermometers

Foxboro-Yoxall, Ltd., of Merton, London, S.W. 19, have issued a well-illustrated booklet (Bulletin 148-5) tabulating and describing their excellent range of dial-type indicating thermometers. By the mono-therm system of design and construction the Foxboro thermometer is either welded or brazed in such a way as to become an integral unit of homogeneous metal. This means the elimination of solder and corrosive soldering flux, with almost complete elimination of seams and joints, thus ensuring longer life than has ever before been built into this type of thermal system. They comprise vapour, gas, and liquid pressure types, and on p. 12 is shown five common methods of installing thermometer bulbs in kettles.

A seal of certification is attached to every Foxboro Dial Thermometer; reliability, accuracy, and quick response being assured by Foxboro-Yoxall forty-five years of experience.

* * *

Water Heater Thermostat

A thermostat which will stand a test voltage of 2,000 may be found in some cases especially useful.

Sunvic Controls, Ltd., have sent us a leaflet dealing with such an instrument, which has other refinements, including resistance to vibration, long life and constancy of setting.

* * *

Fan Testing

A patented inclined tube gauge having range 0/1½″ water, bore of inclined limb not less than 0·2″ diameter, calibrated for liquid specific gravity 0·785, adjustable silvered brass scale, divided to 0·01″ water, with longer lines at 0·05″ and 0·10″, scale aproximately 15″ long, brass fitting throughout, is produced by Negretti and Zambra.

Pitot Tubes for use with above gauge can also be obtained, manufactured of solid drawn brass tubing, nickel plated.

* * *

Industrial Steam Generation Efficiency

A typical example of the fact that "Lancashire" or similar cylindrical boilers can be operated in the food or any other industry at very high thermal efficiency is a plant at a flour - mill in Northamptonshire, having two hand-fired "Lancashire" boilers, 28 ft. by 6 ins., one being a standby and the other an economiser, operating at about 85 lbs. per sq. in. The coal used is of extremely good quality.

A further advantage was gained by the fitting of hand-fired forced-draught steam-jet furnaces, together with the "Turbulence" smoke-preventing bridge, supplied by the Turbine Furnace Co.

The result has been a very great improvement, with black smoke abolished and both the rate of evaporation and the thermal efficiency increased.

FOOD (DEFENCE PLANS) DEPARTMENT

Meat Agents

In connection with the organisation which is being set up by the Food (Defence Plans) Department for the control of meat and livestock in the event of war, appointments have been made to posts of Chief Meat Agent, Deputy Chief Meat Agent and Area Meat Agent. A list of the persons appointed to these posts in Great Britain together with the areas for which they will be responsible is given below:

Chief Meat Agent: Alderman Hugh Wright, M.B.E., Bynghurst, Springfield, Chelmsford.

Chief Meat Agent for Scotland: Mr. D. M. Brown, Scottish Co-operative Society, Ltd., 71, Morrison Street, Glasgow, C. 5.

Deputy Chief Meat Agent: Mr. W. G. T. Blois, O.B.E., National Federation of Meat Traders' Associations, 5, Charterhouse Square, E.C. 1.

Deputy Chief Meat Agent for Scotland: Mr. J. A. Sinclair, J.P., 54, Ravenswood Drive, Shawlands, Glasgow.

* * *

Dried Fruits

The Food (Defence Plans) Department have appointed Mr. A. E. Gough, O.B.E., to be Director of Dried Fruits under the Department's plan for the control of dried fruits in the event of war. Mr. A. E. Gough is general manager of the Overseas Farmers' Co-operative Federations, Ltd.

* * *

Other Appointments

The following appointments have also been made:

Cooking Fats

Mr. G. L. Salton, Director-Designate.

Imported Eggs

Mr. A. Mitchell, M.B.E., and Mr. A. E. Howlett, Directorate-Designate and Assistant Director-Designate.

Mr. A. Mitchell is a past chairman of the London Egg Exchange and acted as Technical Adviser to H.M. Government for the control of imported eggs during the Great War.

Mr. A. E. Howlett is the Manager of the Provision Department of the London Branch of the Co-operative Wholesale Society, Ltd.

CONFERENCE

Sanitary Inspectors Association

The preliminary programme of the fifty-second annual conference at Bournemouth from September 4-9, 1939, has been received. Papers of special interest to food manufacturers are the following: *The Production and Distribution of Milk from the Rural Aspect*; Introducer, C. A. Wilson: *Exposure of Foodstuffs for Sale, with special reference to Markets*; Introducer, William Riley: both of which papers are to be given on September 7; and on September 8, *Modern Methods in Preventing Food Spoilage*; Introducer, W. Clayton, D.Sc., F.I.C.

A Centenary

Robinson and Sons, Ltd., manufacturers of surgical dressings and cardboard boxes, are celebrating this year the centenary of the foundation of their business at Chesterfield in 1839.

Mr. John B. Robinson commenced the manufacture of round pill boxes at his home at Wheat Bridge, Chesterfield. His first wage bill was for three workers, and to-day the firm employs over 3,400.

A.R.P.

Air Raid Shelters

In the Draft Provisional Code for Air Raid Shelters, issued by the Home Office, particulars are given of the Government requirements as regards basement shelters.

Conforming to these requirements and in compliance with the specified loads and stresses, the British Steelwork Association has prepared two designs showing the application of structural steelwork. These designs —a frame type and a wall bearing type—provide for a wide range in the size of basements, and particulars are given in tabular form on each drawing. Where basements do not conform to the size shown the same system can be adapted to meet requirements.

Lithographed copies of the drawings are available on application to the Association.

* * *

A.R.P. Electrical Equipment

The problem of quick communication of Air Raid warnings, and such questions as control centres, shelters, observation posts, A.R.P. services, etc., are important ones in connection with A.R.P.

The utility of a Staff Locating System, which would enable officials to be easily located without the trouble of telephoning or despatching messengers round a building, and which would be available for giving out the standard air raid warning signals, is readily apparent.

Respirator telephones for all persons compelled to remain at their posts are other important items described in a list of A.R.P. Telephone and Signalling Systems, issued by Siemens Brothers.

* * *

Black A.R.P. Lighting for Power Stations

A product of the G.E.C., Osira "Black" glass mercury vapour discharge lamps and fluorescent powders, have found an important and extensive field of application in the problem of A.R.P. lighting for power station control-rooms, switchboards, etc. Osira "Black" lamps illuminate the instruments and labels so that they may be easily read and the controls quickly found with all normal lighting switched off, while the amount of visible radiation is negligible, and the powder used is phosphorescent and will glow for several hours after the lamps have been switched off. Instruments and controls, therefore, remain visible even if the electric supply is suddenly cut off, and necessary emergency action may be taken.

NEW APPOINTMENTS

B.I.F. Appointment

At the suggestion of the Department of Overseas Trade, the Dunlop Rubber Co., Ltd., have agreed that Mr. Harold W. Eley, their advertising manager, should give the Department the value of his guidance and advice as a member of the Publicity Committee of the British Industries Fair. Mr. Eley is a Fellow of the Incorporated Society of Advertisement Consultants and a Fellow of the Incorporated Advertising Managers Association.

* * *

New Birmingham Office

The British Thermostat Co., Ltd., announce that Mr. M. A. Jane, A.M.I.Mech.E., has been appointed to take charge of their new Birmingham office. Mr. Jane, who has been with the company for many years, is well known to large numbers of heating, air-conditioning and refrigeration engineers, and the Birmingham office will be able to handle direct all Midland enquiries for automatic control equipment, and will also be the headquarters of the company's Midland service engineer.

COMPANY REPORT

The Metal Box Company Limited

This company has issued a report of the Directors and Statement of Accounts for the year ended March 31, 1939. In the difficult trading conditions which were rendered the more acute by the international tension the profit was regarded as satisfactory, although lower than last year's record level.

The new printing factory at Hull —the most up-to-date in the country —is now in production and the printing department of the Carlisle factory has been modernised and re-equipped. The Newcastle factory extensions have been completed, and additional buildings are in course of erection at the Hackney factory of Edward C. Barlow and Sons, Ltd.

Details are given of Emergency Measures and A.R.P., Employees' Welfare, etc.

The directors recommended a final Ordinary dividend of 10 per cent. (making 15 per cent. for the year) and a bonus of 2½ per cent. less tax. They also considered it advisable to provide the company with additional working capital, and have, therefore, decided to offer to Ordinary stockholders on the register on June 15, 1939, one new Ordinary share at the price of £2 10s. per share, in respect of each £7 Ordinary stock then held, all fractions being ignored. After the issue of such shares only a small balance of unissued Ordinary capital will remain and a resolution will, therefore, be proposed at the general meeting to increase the authorised capital of the company to £3,000,000 by the creation of an additional 300,000 Ordinary shares.

EXHIBITIONS

Bakers' and Confectioners' Exhibition

A seal of very appropriate design is being issued by the Trades' Markets and Exhibitions, Ltd., to exhibitors at the Bakers' and Confectioners' Exhibition, which is to be held September 2 to 8 next at the Royal Agricultural Hall, London, and of which they are organisers.

In this connection the Directors feel it is desirable to call very special attention to the regulations which stipulate that exhibits in both Bread and Confectionery Sections must be the work either of the competitor himself or of a *bona-fide* employee. In the Bread section the manufacture must be the work of a Master Baker or an employee of at least three months' standing, while the Confectionery section is governed by the ruling that exhibits must be the work of the competitor himself or of an employee of a minimum period of six months. In both cases the work must be done on the premises of the Competitor.

It is announced that Counsel's opinion has been taken on this matter, and any competitor knowingly sending in exhibits not complying with these regulations may be charged with conspiracy, and make himself liable to fine or imprisonment.

* * *

B.I.F. Trade Barometer

A further indication of a continuation of the revival in trade is afforded by the figures for next year's British Industries Fair announced by the Department of Overseas Trade.

One week after the issue of forms of application for space in the London Section of the Fair the space applied for shows a marked increase over last year: 265,640 sq. ft., as against 236,308 sq. ft. a year ago.

The space applied for in the Furniture Section is 201,409 sq. ft., a larger area than that which, it is anticipated, will be available, and 7,000 sq. ft., more than it occupied this year.

A New Service

Again, next week, readers of FOOD MANUFACTURE can look forward to their weekly newspaper *Food Manufacture Weekly*, which gives them all the events of the food industry while these events are still news. Next week is a special Cold Storage and Transport number.

In addition, all the news of personalities; commodity prices for the manufacturing buyer of food raw materials. It publishes all the news, good and bad, favourable and unfavourable, but its first and main platform which will always hold the food manufacturer's interest is that it tells the food world what the other fellow is doing and what he looks like, and *Food Manufacture Weekly* also prints all sorts of practical manufacturing hints and tips.

Regular features in the weekly edition include a special trade news summary for executives; list of the new trade marks registered during the current week; details of weekly arrivals of canned fruits into Great Britain; data on every forthcoming trade exhibition in almost every part of the world; Smithfield prices for the week; and a special Stock Exchange report on food industry firms. A new item attracting attention is "Opportunities," which is a digest of information from all parts of the world, giving countries requiring manufacturers, exporters or importers of all commodities in the food industry. Latest patent applications are published each week, together with special particulars of new companies.

LITERATURE RECEIVED

Vitamin A and D Concentrate

An interesting booklet, designed to give the manufacturer some information concerning the fat-soluble vitamins A and D which may be of assistance to him should he be contemplating their use in any of his products, has been sent to us by MacAndrews and Forbes, Ltd., who are the selling agents for Great Britain and Colonies of "Covitol", the new vitamin A and D concentrate, which may be used for all purposes.

Manufactured by E. and O. Collett and Co., of Oslo, "Covitol" vitamin concentrates are obtainable in the form of oil, emulsions, powders and clear solution. They are prepared in such a way as to be entirely free from any fishy taste or smell, although containing exclusively the natural vitamins derived from fish livers, and are, therefore, suitable for vitaminising practically any foodstuff or pharmaceutical preparation.

Products for which "Covitol" oil is already being used, or for which it is suitable, are margarine, chocolate and other confectionery, also pharmaceutical preparations in the form of emulsions, capsules, tablets, etc.

"Covitol" emulsion can in most cases be supplied in the same potencies as the oil, and is already being employed for vitaminising milk, cheese, synthetic cream, confections (for some lines it is found more suitable than the oil), tonic syrups and emulsions.

Being oil soluble the vitamins A and D cannot be mixed with aqueous substances without causing cloudiness, and for this reason "Covitol" solution has been produced, and is used for syrups and drinks such as ginger-beer, stout, cordials, etc.

The powder concentrates are, it is believed, the first to be marketed in this form containing exclusively natural vitamins, in which the vitamins show a really good stability, and are at present being used first and foremost to make Glucose-D or A + D, then to vitaminise infant and invalid foods, custard powder, etc., while it can be used with any powder products, including cocoa or cup chocolate.

* * *

Canned Foods Booklet

The third of a series which will be published featuring family-sized recipes for the use of canned foods is a booklet sent to us by the Home Economics Division of the National Canners Association of Washington, D.C.

Sponsored by the National Canners Association, these booklets should do a great deal to popularise further the various canned lines offered by those manufacturers whose joint co-operation has resulted in such excellent publicity.

* * *

City of Hull

Hull claims to be one of the first cities to discern the benefits which might be derived from the adoption of a definite policy of encouragement for industrial development. Hull has been fortunate in the lead which its development committee has given in insisting upon a sound scheme of continuous advertising, supported by an organisation equipped with information and ability to present the claims of the city in terms convincing to enquiring industrialists.

Hull is now reaping the benefit of ten years of continuous effort in proclaiming its advantages as an industrial centre, and the Annual Report, just published by the Development Committee, records the establishment of a variety of industries, including whale oil refinery and edible oil manufacture, which oil is an important addition to the Hull oil milling industry, which already formed the largest centre for seed crushing and oil extracting in the country.

Whilst the amount of direct employment provided is considerable and is a welcome relief to the unemployment situation, the effect of the establishment of the new industries upon the existing trade of the city and port is remarkable. In imported raw material alone it is estimated that the new industries are bringing an additional half-million pounds' worth of new trade to the port annually.

Tower of Empire for Sale

Purchasers of the Great Wheel at the Earls Court Exhibition and the "Flip-Flap" at the White City, George Cohen, Sons and Co., Ltd., have acquired the Tower of Empire from the Empire Exhibition authorities at Glasgow; the two high-speed lifts having been sold to the Express Lift Co., Ltd.

During the six months' period of the exhibition nearly £30,000 was taken at the turnstiles, but although there have been a number of enquiries from local authorities interested in the obvious lucrative possibilities of the Tower, finality has not been reached. Demolition will now go straight ahead, and intending purchasers will have to hurry, as there will come a point at which it may not be possible to sell the Tower for re-erection.

* * *

British Standards Institution

Dr. E. F. Armstrong, F.R.S. past chairman of the British Standards Institution, took the chair at the Annual Meeting in the unavoidable absence of the chairman, Sir Frank Heath, G.B.E., K.C.B., due to ill health.

The Right Honourable R. S. Hudson, M.P., Parliamentary Secretary to the Department of Overseas Trade, in proposing the toast of the British Standards Institution at the annual luncheon of the Institution at the Dorchester Hotel on June 15, said that there was no doubt at all that standardisation had helped to reduce costs and to foster co-operation between manufacturers and consumers. Above all it had helped to solve the problem of making available stocks of spare parts. In that way it had served the double purpose of encouraging the prosperity and utility of United Kingdom industry and of helping to overcome criticism from customers abroad.

He had been astounded to see the multiplicity of the various interests which the Institution represented and was glad to find that it was paying particular attention to the problems of the export trade, and on behalf of that it was engaged in taking part in international conferences which were trying to import some degree of order into international relationships. He sincerely admired the work which was being carried out by the Institution, which was of real national importance.

Sir Percy Ashley, K.B.E., C.B., member of the Import Duties Advisory Committee, was elected chairman, and paid a tribute to the efforts of the Institution in the interests of British trade.

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Advertising Scheme

Described as "Free Holidays by the Sea", a scheme to popularise their meat foods has been introduced by United Cattle Products, Ltd., whose factory at Levenshulme, Manchester, was described in our last issue.

Cash and other prizes are being offered in a children's painting and essay competition.

We are advised that the success of the scheme has resulted in all previous turnover records being broken.

* * *

Insect Control

Both in this country and in America regulations regarding food and drug inspection are being strengthened, and one of the greatest inspection helps offered to the packer is the Wide Field Binocular Microscope AKW manufactured by Bausch and Lomb.

It is very simple of operation, and is especially valuable for insect and worm parts control, since authorities suggest that the only safe method is to make counts of worm fragments.

Plenty of room is allowed for a large Petri dish, which together with the long working distance permits the examination of large irregularly shaped objects of all types with the utmost ease.

If desired the microscope can be readily taken to any part of the plant, and the price is exceptionally moderate.

* * *

National Mark for Green Peas

The National Mark Scheme for Green Peas has been revised and new regulations are now in operation.

Copies of these regulations, the Agricultural Produce (Grading and Marking) (Green Peas) Regulations, 1939 (S.R. & O. No. 691), may be obtained (price 1d. each exclusive of postage) from H.M. Stationery Office.

A New "Mireem" Product

"Mireem" Pure Coffee Extract or Atomised Coffee Powder is not a substitute for or an imitation of coffee, but is claimed by its makers to be produced from freshly roasted, specially selected beans by a process which has cost £30,000 to perfect.

No adulterant or preservative is added at any stage of manufacture, and the result is pure concentrated coffee which will keep indefinitely.

Products possessing a true coffee flavouring make a very wide appeal and have an increasing demand, and its suitability extends to practically every branch of food industry.

Manufacturers who have not already tested the applicability of "Mireem" to their own products are invited to write to Atomised Food Products, Ltd., for a sample of either the pure coffee extract or atomised coffee powder.

For those manufacturers whose technical needs require a specially concentrated form of flavouring, "Mireem" special concentrated pure coffee extract has just been made available. Apart from its greater potency (being three-and-a-quarter times that of the standard extract), and reduced bulk, it is identical with the other "Mireem" products, being made only from coffee beans, although in this case colouring matter has been added.

* * *

London's First "Air Restaurant"

London's first "air restaurant" will be opened early in August. It will be the passenger dining-room in Imperial Airways' new terminal in Buckingham Palace Road.

In luxuriously spacious surroundings, diners will be served by waiters attired as Flight Stewards, while the Maître d'Hotel will wear a uniform.

The Chief Chef will be an Englishman—as will be the whole catering staff. The "plat du joir" will have an aviation flavour. If composed of fish, the dish will be called after a flying-boat, such as "Sole Cabot", or if it is a meat dish the name of a landplane will be used, such as "Fingal entrecôte de veau".

The restaurant has thermostatically controlled air conditioning which will keep the temperature at an equal level.

The kitchen is one of the few in London which has both natural light and a regulated supply of fresh air. Tiled throughout in white, the refrigerators are cellulosed white in keeping.

* * *

Air Conditioning

Dr. L. H. Lampitt, in a paper read before the Chemical Engineering Group of the Society of Chemical Industry in 1934, said that "the mention of air conditioning is sufficient with many people to bring to mind a complete plant which will maintain the temperature and moisture content of the artificial atmosphere within rigid limits year in and year out, when actually a far simpler machine is all that is necessary. It would appear that the idea of complete conditioning with its attendant high cost has militated against the more general adoption of semi-complete conditions which in themselves would be a distinct advantage in many cases". Partial conditioning is often sufficient to meet economic demands, especially in this country where extremes of climate are less than in America, where air conditioning has made such enormous progress.

A booklet recently issued by the Sturtevant Engineering Co., Ltd., contains some useful information for prospective users of air-conditioning plants and also photographs and descriptions of some typical installations in this country covering a wide range of industries.

* * *

Lectures on Foodstuffs and Canning

A series of courses on the chemistry and microbiology of foodstuffs, canning and cold storage are to be given during the 1939-40 session at the Borough Polytechnic.

The separate courses are as follows:

The Chemistry of Food and Nutrition. Lecturer: H. G. Rees, A.R.C.S., A.I.C., which will cover the Principles of Nutrition and the Chemical Composition of Foodstuffs.

Microbiology of Foodstuffs. Lecturer: H. A. Parker, F.I.C. This course is in two parts, theoretical and practical.

Technology of Canning. Lecturers: J. G. Huntley, B.A., and R. K. Sanders, M.A. General history; tinplate manufacture; bacteriology and the technology of meat, fruit and vegetables, and fish canning; chemical changes in canned foods will be discussed.

Cold Storage. Lecturer: W. R. Woolridge, M.Sc., Ph.D., M.R.C.V.S. This course is intended for those engaged in industries involving the storage of food and perishables.

Other courses are *Engineering Refrigeration* and *Refrigerating Plant (Functioning and Maintenance)*.

The actual courses start on Monday, September 25, and the dates for enrolment are: For past students, September 11, 13 and 15, and for new students September 18, 20 and 22.

Further information and a copy of the syllabus may be obtained from the Chemistry Department (E. C. Pickering, Ph.D., F.I.C.), Borough Polytechnic, Borough Road, London, S.E. 1.

INFORMATION AND ADVICE

Cloudy Orange Lemonades—Table Shaker Salt—Mustard—Baking and Confectionery Fats—Glass Packing of Vegetables—American "Cookies"—Ice-Cream Powder—Coating Nuts with Sugar—Information Supplied—Information Required

Cloudy Orange Lemonades

5,402. *We are manufacturing a pulpous extract for cloudy orange lemonades which is composed of orange pulps, essential oil of orange, a little pharmaceutical paraffin oil, gum arabic and chemically pure glycerine, these three last-mentioned products being mechanically emulsified. We understand that lemonade manufacturers employ this extract by simple addition of sugar-syrup, citric acid and carbonic gas.*

A strange phenomenon happens in the lemonades: A foaming and white brim appears in the neck of the bottle at the surface of the liquid. This white brim seems to be composed of fatty air bubbles, and after several days' rest it clings to the glass. It should be mentioned that a simple but energetic shake causes the brim to vanish, and we are assured that there is no question of any sort of fermentation.

We wonder if any of your readers have encountered a similar phenomenon, and should be very pleased to have suggestions how this white brim can be avoided. (Brussels.)

We have carefully considered your enquiry, but find it difficult to suggest a remedy without actually examining the froth, as this phenomenon is unfamiliar to us. Could you let us know if this re-appears after it has been once dispersed by shaking?

Table Shaker Salt

5,409. *Could you supply us with methods of manufacturing a high-grade table shaker salt, including the method (if any) of bleaching same? Also the type of grinder used and the gauge of sieve required to produce a product of the requisite fineness. The raw salt to be used has an analysis as follows:*

Sodium chloride ..	..	99·77 *per cent.*
Magnesium chloride	..	0·11 ,, ,,
Magnesium sulphate	..	0·07 ,, ,,
Calcium sulphate	..	0·01 ,, ,,
Insoluble matter ..	..	0·04 ,, ,,

We also require a recipe for a high quality celery salt. (Perth, W.A.)

As regards free-flowing table salt, it is not an economic proposition to try to improve the quality of salt by re-crystallisation or any other method. It is best to start off with a salt of good quality. To make it free running, add tri-calcium phosphate. Particulars of the correct quantity to add can be obtained from the suppliers of the phosphate, to whom you should submit a sample of the salt you propose to treat.

Name and address of manufacturer of complete equipment for plant for free-flowing table salt was given. In order to make celery salt, 1 fluid oz. of celery seed oil should be added to 5 lbs. of salt, darkened with 1 lb. of powdered celery seeds.

Mustard

5,420. *We should be obliged for information in connection with the manufacture of mustard. What does the finished product contain? Is any colouring agent employed? What process is employed to remove the skin? From whom could we obtain grinding plant?* (Delhi.)

The moist type of mustard usually contains ground mustard seed, yellow corn meal, salt, vinegar, turmeric, and some flavouring agent such as Worcestershire sauce, mushroom powder, or port wine. Yellow corn meal and turmeric are generally used for colouring matter. Prior to grinding, part of fixed oil is removed by pressure and husks are winnowed off.

Name and address of manufacturer of special grinding plant was given.

Baking and Confectionery Fats

5,433. *Could you give me any information regarding the general manufacture of baking and confectionery fats? As a chemist I am conversant with available methods for testing various oils and fats, but lack of knowledge with reference to the initial component oils available for fats manufactured in England and America, together with the effect of the "hydrogenation" process employed, makes identification of the original oils used in the fats well-nigh impossible. I should be pleased to procure information on the effect of hydrogenation to the iodine values of pure oils, etc.* (Christchurch, N.Z.)

We regret that the hydrogenation of fats is too large a subject to deal with in these columns.

We would strongly advise you to obtain *The Utilisation of Fats*, by H. K. Dean, B.Sc., Ph.D., A.I.C., which could be obtained through this office, price 15s. 8d. post free. This book contains a section on the hydrogenation process and includes a long list of references to other published matter on this subject.

Glass Packing of Vegetables

5,447. *We should be obliged if you would give us some information with reference to the glass packing of vegetables.* (Dublin.)

The glass packing of vegetables is similar in its preliminary stages to canning. The processing can be

carried out either in steam or water, but glass being not such a good conductor as tin, a longer time is required to reach the required temperature, and a correspondingly longer time is required to cool the pack. In processing above 212° F., either water or air pressure must be used in excess of that generated in the retort at the temperature of processing. This is necessary to hold the covers in place and to prevent breakage. The pressure is maintained until the jars have cooled below the temperature of sealing. Before installing equipment for glass packing you would be well advised to consult the makers of plant regarding efficient layout.

American "Cookies"

5,459. *We are anxious to obtain recipes for the manufacture of American "Cookies".* (Alexandria, N.S.W.)

We give below two recipes which will produce very good cookies at low cost:

Sugar Cookie Mix.

Sugar	3 lbs.
Winter wheat flour	6 ,,
Cottonseed oil	6 oz.
Bicarbonate of soda	1 ,,
Egg yolk (granulated)	1 ,,
Whole milk powder	5 ,,
Salt	1½ ,,
Egg colour } Flavour }	Trace

Spicy Cookie Mix.

Brown sugar	3 lbs.
Winter wheat flour	6 ,,
Cottonseed oil	6 oz.
Bicarbonate of soda	1 ,,
Egg yolk (granulated)	1 ,,
Buttermilk powder	5 ,,
Salt	1½ oz.
Cinnamon	1 ,,
Allspice	¼ ,,
Ginger	¼ ,,
Nutmeg	¼ ,,

Directions: Mix 5 lbs. of Cookie Mix with 1 quart of water and make dough. Roll out and cut. Two lbs. of Cookie Mix makes 3½ to 4 dozen cookies.

Ice-Cream Powder

5,464. *We shall be pleased to receive some information about and recipes for ice-cream powder. The product is marketed in Norway at a price of 15 to 16 Norwegian kroner per kilogram and is used at a rate of 5 grams per litre of ice-cream.* (Trondheim.)

The following is a formula for ice-cream powder:

Sugar	70 lb.
Skim milk powder	17·5 ,,
Filler	7·5 ,,
Colloid	5 ,,

General directions are 1½ lb. to 1¾ lb. of mix to 1 gal. of milk. This type of mix is not heated and starchy fillers like cornflour cannot be used, instead soya bean flour or powdered dried egg yolk may be tried.

Care should be taken in choosing the type of milk powder, as some powders are not completely soluble; spray process type is usually preferred. The colloid used must be a gum soluble in the cold, gelatine is therefore not suitable. We suggest gum tragacanth or gum arabic, or a mixture of the two, or Irish or Iceland moss, or some of the proprietary stabilising agents like Tragasol, Gelozone, and Blandola.

Coating Nuts with Sugar

5,476. *We are preparing considerable quantities of cashew nut kernels in India. I am requested to take up the investigation of coating the kidney-shaped kernels or soaking them in cane sugar or glucose syrups with a view to making them taste sweeter. In fact, such things are known in the case of almonds. I believe the glucose syrup may not be useful, because the products will be quite sticky. Cane sugar seems to be better for the purpose. I believe solid dextrose (pure) is out of consideration unless it is as cheap as cane sugar. Although it is desirable it does not seem possible to stamp each one of them with some form of trade mark.*

Is it also possible to lightly bleach the kernels? If so, I should be pleased to hear from a firm dealing in the necessary component parts. (Bangalore.)

For information on coating nuts with sugar, we would strongly recommend you to obtain a copy of the book *Sweet Manufacture*, by N. F. Scarborough, price 7s. 6d., published by ourselves, and which has been previously recommended in these columns. This work contains a section on revolving pan goods and describes fully the process for coating almonds, with a description of the plant required and problems likely to arise.

If by bleaching is meant the removing of the brown skin from the nut, we understand that no plant has yet been devised for removing this from cashew nuts owing to their irregular shape.

Names of firms manufacturing other necessary plant have been sent.

Information Supplied

5,486. *Could you let us know the names of manufacturers of machines suitable for crushing and extracting juice from oranges and lemons, etc.?* (Leeds.)

Names and addresses of manufacturers were given.

Information Required

5,403. *We have been asked to give the name of the manufacturers of "Crowpack" (possibly "Crowpak" or something similar). Reference to our own directories has failed to give any clue, and we are wondering whether you have any information to give us.* (Purfleet.)

5,408. *We shall be glad if you can give us the name and address of the manufacturers of "Avenex", a preparation made in the U.S.A. from oat flour.* (Holland.)

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RECENT PATENTS

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

Pectin

The spent mash after the separation of solvents produced by the fermentation of citrus waste by Clostridium Acetobutylicum (Weizmann) and removal of the cellulose is concentrated and alcohol is added to precipitate partially degraded and demethylated pectin which is not suitable for the preparation of jellies, but may be used as an emulsifying agent, as a stiffening agent for textiles and as a stabiliser for therapeutic colloidal solutions of silver, gold and other metals.

500,281. Rosenfeld, B.

Valves, etc.

A vent for permitting the escape of gases from cheese containers, etc., consists of a sleeve which is stretched over a cylindrical part of the container bearing the vent holes, and is formed of a plastic non-porous rubber layer which contacts with the container and a backing of resilient compressible rubber, preferably of vulcanised spongy rubber. The plastic layer constitutes the seal.

500,260. Dewey and Almy, Ltd.

Yeast

The ammonium salt of acetic or other aliphatic monocarboxylic acid is used as a nutrient in the growing of yeast. The salt may be added as such or in the form of materials adapted to form it *in situ*, *e.g.* acetic acid and organic nitrogen or ammonium hydroxide. The nutrient may be added all at once or in steps, and other nutrients such as ammonium sulphate, phosphates and lactates may be present.

502,762. International Yeast Co., Ltd., and Meyer, E. A.

Clarifying Sugar Solutions

Beet sugar juice is treated with excess lime and a part or whole of the precipitated and suspended matter is removed before saturating with carbon dioxide and used again for clarifying fresh sugar juice. If desired the loss of lime alkalinity in the second clarification is compensated for by the addition of fresh lime.

503,121. Zimmerman, B.

Plant for Making Ice-Cream

In apparatus for filling receptacles with plastic substances, such as semi-frozen ice-cream, the ice-cream passes from a

FIG. 1.

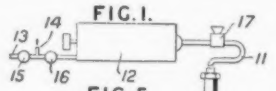
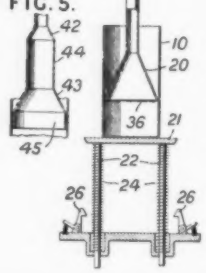


FIG. 5.



pressure freezer 12 (fed by a pipe 13 past a meter 15, air-inlet 14 and pump 16) through a conduit 11, nuts, etc., being added at 17 if desired, and into a cone-shaped nozzle 20, the largest diameter of which approximates to that of the receptacle 10. This shape allows of gradual expansion of the contained air and maintains an even distribution of the contained nuts, etc. A grating 36 supports the material in the nozzle during the changing of receptacles. The nozzle may be vertically slidable on the conduit and may be counterbalanced. In another form, Fig. 5, the nozzle comprises two conical sections 42, 43, and cylindrical sections 44, 45, the latter conforming substantially to the cross-section of the receptacle. When the receptacle is vertically movable, as in Fig. 1, it is supported on a platform 21 supported by sliding rods 22 and springs 24. Spring detents 26 hold the platform at the bottom of its travel during the changing of receptacles.

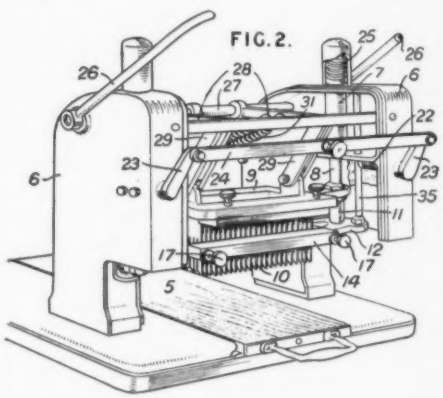
501,863. Cherry-Burrell Corporation.

Tendering Meat

In a meat-tendering apparatus, the stripper 12, 14 descends with the knives 10 until it contacts with the meat when it is locked by clamping screws 22, turnable by arms 23 connected by an operating-rod 24, bearing on rods 35 carried by the stripper frame 12. The stripper remains locked whilst the knives penetrate into the meat and are withdrawn therefrom. The stripper comprises slightly pointed bars on the front 14, the bars passing between the knives and the points resting in a groove in the rear edge of the frame 12. The frame 12 has vertical rods (not shown in Fig 2) slidable in holes in the knife-carrying block 9, the upper ends of the rods being provided with washers retained in place by split-pins, so that the knife block 9 raises the stripper after the knives have left the meat and the locking-screws 22 have been released. The front 14 is secured to the frame 12 by screws 17. Rods 11 are secured to the frame 12 and slide in tubes 8 secured to the knife-block 9, the tubes 8 being slidable in tubes 7 carried by the side supports 6. Springs 25 are arranged to press on the rods 11 to urge the stripper downwards. The knives are depressed by a handle 26 on a shaft 27 having arms 28 connected to the knife-block by links 29. Springs 31, anchored at one end, and connected to an arm on the shaft 27, raise the knives when the handle is released. The bar 24 is provided with stop-pegs to prevent the screws 22 from being turned too far. The meat is placed on a board 5 which is then slid beneath the knives.

503,054. Venning, L. E., and Venning, B.

FIG. 2.



Complete Specifications Accepted

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

506,214. Kellie and Son, Ltd., R., and Kellie, R. W.: Machines for filling jars with preserves and other similar liquid and semi-liquid substances.

505,991. McDonald, H. M.: Methods of and apparatus for the clarification and deodorisation of milk and/or cream.

Latest Patent Applications

13810. Szabo, N.: Devices for ascertaining the quality of flour, etc. May 9.

13681. Douglas, W. von Grumme-: Production of yeast preparations. May 8.

13489. Lever Bros. and Unilever, Ltd., Waal, L. de, and Andersen, A. J. C.: Production of frozen confections, etc. May 5.

15811. Leggate, J.: Gas storage of perishable commodities, etc. May 30.

15776. Oelwerke Noury and Van der Lande Ges.: Production of vitamin F preparations. May 26.

15646. Heller, B.: Method of preserving meat. May 26.